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TO

PRACTICAL PHARMACY

FOR

MEDICAL STUDENTS.

Adapted for the Examination in 'Practical Pharmacy'
of the Conjoint Board, etc., and for General Use.

BY

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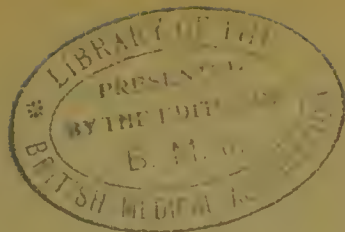
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PREFACE

THIS book is intended to replace the author's 'Practical Pharmacy for Medical Students,' of which it is a new and revised edition. No pains have been spared to make the work thoroughly reliable, and the author expresses his acknowledgments to the many teachers of pharmacy who have given him much valuable criticism and advice. Small as the book is, it contains all the information it is necessary for a student to possess who presents himself for the examination in Practical Pharmacy of the Conjoint Board.

A. C. S.



SYLLABUS OF THE EXAMINATION IN
PRACTICAL PHARMACY
OF THE

CONJOINT EXAMINING BOARD OF
PHYSICIANS AND SURGEONS IN ENGLAND

PRACTICAL PHARMACY.

- (a) The general nature and composition, and the most important physical and chemical characters, of the Pharmacopœial drugs named in the annexed schedule.
- (b) The composition of the Pharmacopœial preparations of these drugs, and the processes employed in making them.
- (c) The doses of these drugs and of their preparations.
- (d) The candidate will be required to recognise the drugs indicated *by italics* in the annexed schedule.

SCHEDULE OF DRUGS.

Calx Chlorinata ; Liquor Sodæ Chlorinata.

Ammonii Bromidum ; *Potassii Bromidum* ; Sodii Bromidum.

Iodum ; *Potassii Iodidum* ; Sodii Iodidum ; Plumbi Iodidum.

Sulphur Sublimatum; Sulphur Præcipitatum; Calx Sulphurata; Potassa Sulphurata.

Phosphorus; Calcii Phosphas; Sodii Phosphas; Ferri Phosphas; Calcii Hypophosphis; Sodii Hypophosphis. Acidum Hydrochloricum; Acidum Nitricum; Acidum Sulphuricum.

Acidum Aceticum; Acidum Citricum; Acidum Tartaricum.

Acidum Boricum; Acidum Sulphurosum.

Acidum Hydrocyanicum Dilutum.

Liquor Ammoniae; Liquor Potassæ; Potassa Caustica.

Ammonii Carbonas; Ammonii Chloridum; Liquor Ammonii Acetatis.

Potassii Bicarbonas; Potassii Sulphas; Potassii Chloras; Potassii Tartras Acidus; Potassii Permanganas.

Sodii Bicarbonas; Sodii Sulphas; Sodii Nitris; Borax.

Calx; Calcii Hydras; Creta Præparata; Calcii Carbonas Præcipitatus.

Magnesia; Magnesii Carbonas; Magnesii Sulphas.

Alumen; Alumen Exsiccatum.

Zinci Oxidum; Zinci Chloridum; Zinci Sulphas.

Cupri Sulphas.

Argenti Nitras.

Hydrargyrum; Hydrargyri Oxidum Flavum; Hydrargyri Oxidum Rubrum; Hydrargyri Subchloridum; Hydrargyri Perchloridum; Hydrargyri Iodidum Rubrum; Hydrargyrum Ammoniatum; Hydrargyri Oleas; Liquor Hydrargyri Nitratis Acidus.

Plumbi Oxidum; Plumbi Acetas; Liquor Plumbi Subacetatis Fortis.

Antimonium Tartaratum.

Acidum Arseniosum; Ferri Arsenas; Sodii Arsenas; Arsenii Iodidum; Liquor Arsenii et Hydrargyri Iodidi.

Bismuthi Subnitras; Bismuthi Carbonas; Bismuthi Salicylas.

Ferrum; *Ferri Sulphas*; Ferri Sulphas Exsiccatus;
Ferri Carbonas Saccharatus; Syrupus Ferri Iodidi;
Liquor Ferri Acetatis; Liquor Ferri Perchloridi;
Liquor Ferri Pernitratis; Liquor Ferri Persulphatis;
Ferri et Ammonii Citras; *Ferri et Quininæ Citras*;
Ferrum Tartaratum; *Ferrum Redactum*.
Alcohol Absolutum; *Spiritus Rectificatus*; *Æther*;
Chloroformum; *Iodoformum*.
Chloral Hydras; Butyl-Chloral Hydras; *Paraldehydum*;
Sulphonal.
Amyl Nitris; *Tabellæ Trinitrini*; Liquor Trinitrini;
Spiritus Ætheris Nitrosi.
Acetanilidum; Phenacetinum; Phenazonum.
Collodium.
Cresotum; *Acidum Carbolicum*; *Acidum Salicylicum*;
Sodii Salicylas; Salol.
Aconiti Radix; Aconitina.
Opium; Morphinæ Hydrochloridum; Morphinæ Acetas;
Morphinæ Tartras; Apomorphinæ Hydrochloridum;
Codeina; Codeinæ Phosphas.
Cocæ Folia; Cocaina; Cocainæ Hydrochloridum.
Jaborandi Folia; Pilocarpinæ Nitrates.
Quassia Lignum; *Calumbæ Radix*; *Gentianæ Radix*.
Physostigmatis Semina; Physostigminæ Sulphas.
Caffeina; Caffeinæ Citras.
Conii Fructus et Folia.
Asaætida; *Ammoniacum*; Myrrha; *Guaiaci Resina*.
Cinchonæ Rubræ Cortex; Quininæ Sulphas; Quininæ
Hydrochloridum; Quininæ Hydrochloridum Acidum.
Salicinum.
Ipecacuanhæ Radix; *Senegæ Radix*.
Glycerinum.
Nux Vomica; Strychnina; Strychnine Hydrochloridum.
Belladonnæ Radix et Folia; Atropina; Atropinæ Sul-
phas; Hyoseyami Folia; Hyoseinæ Hydrobromidum;

Hyoseyaminæ Sulphas: *Stramonii Semina et Folia*;
Homatropinæ Hydrobromidum.

Cannabis Indica.

Digitalis Folia; *Strophanthi Semina.*

Oleum Ricini; *Oleum Crotonis*; *Aloe Barbadeensis*; *Aloe Socotrina*; *Aloinum*; *Cascara Sagrada*; *Colocynthis Pulpa*; *Elaterium*; *Elaterinum*; *Jalapa*; *Podophylli Rhizoma*; *Rhei Radix*; *Senna Alexandrina et Indica*; *Camphora*; *Oleum Terebinthinæ.*

Acidum Tannicum; *Acidum Gallicum*; *Kino*; *Catechu*;
Hamamelidis Cortex et Folia.

Acidum Benzoicum.

Copaiba; *Cubebæ Fructus.*

Colchici Cornus et Semina.

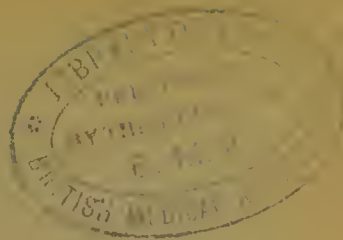
Scilla.

Filix Mas; *Santoninum.*

Ergota.

Oleum Morrhuæ.

Cantharis.



A I D S

TO

PRACTICAL PHARMACY FOR MEDICAL STUDENTS

INTRODUCTION.

The 'British Pharmacopœia.'

THIS is a volume published, from time to time, by direction of the General Council of Medical Education and Registration of the United Kingdom, the current edition being published in 1898. It contains an account of approved drugs and preparations, with doses, descriptions, and processes for preparing medicines. Drugs and preparations in the Pharmacopœia are known as 'official,' and if ordered in a prescription or sold must be of Pharmacopœial strength and quality. A large number of drugs are in common use which are not official; these are often referred to as 'officinal.'

The student must regard the Pharmacopœia at present as *the* authority for doses, characters of drugs, and their preparations. The letters B.P. affixed to the name of a drug or preparation denote that it corresponds to that described in the Pharmacopœia.

Pharmaceutical Processes.

In the course of the student's practical chemistry he will have become familiar with the ordinary operations of

filtration, solution, distillation, etc. Besides these, the following processes are used in pharmacy:

Elutriation.—This is a method of separating the heavier particles of an insoluble powder from the lighter by means of water. The powder is shaken up with water, the mixture allowed partially to subside, the supernatant liquid poured off, and the powder suspended in it collected; it is thus a method of 'water-sifting.' Prepared chalk is made in this way.

Lixiviation is performed by rubbing the substance to be lixiviated with a comparatively small amount of water; in this way the more soluble portions of the body are removed. Lixiviation is usually performed upon the ashes of an ignited body.

Maceration.—This may be defined as the extraction of the soluble matter of a drug by soaking it in a solvent, called the 'menstruum.' The more or less finely-divided drug is placed with the menstruum in a closed vessel for seven days, the mixture being frequently shaken during this interval. The mixture is now strained, the solid matter (called the 'marc') pressed, and the expressed liquid added to the strained liquid. The whole is now filtered, if necessary. This is the 'Process of Maceration' of the Pharmacopœia, and is referred to in the following pages as 'Maceration.' A special case of maceration is 'Digestion,' in which maceration is conducted at a gentle heat.

Percolation or Displacement.—This may be defined as the extraction of the soluble matter of a drug by the descent of a liquid through it. The more or less finely-divided drug is moistened with the menstruum, and set aside in a closed vessel for twenty-four hours. The moist drug is now packed in a 'percolator.' This is an elongated cylindrical, conical, or pear-shaped vessel, placed in a vertical position, and which has its lower contracted end loosely plugged with tow or cotton-wool, or tied over with calico or muslin. More of the menstruum is added to the top of the column of drug, through which it slowly descends, dissolving in its path the soluble matter of the drug. The process is continued until the drug is exhausted or sufficient liquid 'percolate' has been collected. The marc is pressed and the preparation completed as in the process of maceration. In some cases sufficient menstruum is added to the perco-

late to make it measure a definite volume. This is 'The Process of Percolation' of the Pharmacopœia, and is referred to in this book as 'Percolation.'

Pulverization.—In the manufacture of liquid preparations of drugs, it is important that the drug be in a fine state of division, in order that the menstruum may thoroughly penetrate the mass. Thus, the Pharmacopœia directs tinctures, etc., to be made with drugs in powder of No. 20, No. 60, and so on. These numbers refer to sieves through which the drug is to be passed, each sieve to have that number of parallel meshes in 1 inch.

Drugs are usually powdered on a large scale, and in mills, and purchased by chemists in powder.

Students should remember that most vegetable drugs have to be dried before powdering, and that the appearances of a drug (either mineral or vegetable) in powder and in crystals or natural state are often very different. Some which are highly coloured as crystals are nearly white in powder, and vegetable drugs present similar changes.

Trituration.—Applied to intimately mixing finely-powdered drugs in a mortar.

Levigation.—Applied to powdering substances as finely as possible by the aid of liquids, etc. The substance is made into a thin paste with water, oil, glycerine, lard, or other medium, and rubbed in a pestle and mortar, or with a knife upon a slab; by this means the substance can be very finely divided. It is used in the manufacture of ointments.

Pulverization by Intervention or Mediate Pulverization.—This consists in using some extraneous and inert substance to assist pulverization. Thus, a little alcohol assists the pulverization of camphor; and in making tinctures, etc., the drugs may often be ground to fine powder with sand.

Medicinal Preparations.

The object of these preparations is to obtain the drug, or its soluble or part of its soluble constituents in as convenient and elegant a form as possible. Since drugs vary much in solubility and activity, it is obvious that preparations of different drugs will require different processes for

their manufacture. Particulars of these processes are to be found in the Pharmacopœia.

The activity of the preparation of a drug must necessarily vary with that of the drug itself; but there are some preparations which are known as 'Standardized,' which contain a fixed and constant proportion of some active principle or principles.

The drugs the preparations of which are standardized are: Belladonna, Cherry laurel, Cinchona, Ipecacuanha, Jalap (tincture), Nux Vomica, and Opium (see under each drug).

The chief classes of preparations of the Pharmacopœia are:

Aceta (Vinegars).—These are prepared by macerating the more or less finely-powdered drug in dilute acetic acid. Acetic acid is a better solvent for some drugs than water or spirit.

There are three official, those of Cantharides, Ipecacuanha, and Squill.

Aquæ (Waters).—The official waters are made in two ways:

1. By distilling the drug or its essential oil with water. In this way are prepared the 'Aromatic Waters,' as those of dill, peppermint, etc. These waters may be improvised by triturating the corresponding oil with twice its weight of calcium phosphate and 500 times its volume of distilled water, and filtering; the Pharmacopœia allows this process for use in hot climates. (Note that Aqua Laurocerasi is a standardized preparation containing 0.1 per cent. of prussic acid.)

2. By dissolving the drug in cold distilled water. Camphor water and Chloroform water are made in this way.

It is to be noticed that for dispensing prescriptions, and for the manufacture of most of the preparations in which water is used, the Pharmacopœia directs the employment of distilled water.

Collodia (Collodions).—These are solutions of gun-cotton in ether or ether and alcohol. When applied to the skin, the solvent evaporates and leaves a film of pyroxylin. There are three: Collodion, Flexible Collodion, and Blistering Collodion.

Chartæ (Papers).—These are strips of paper, coated

with indiarubber, impregnated with some drug active externally. Mustard-paper is the only example.

Confectiones (Confections or Electuaries).—These are pastes made by mixing the dry powdered drug with syrup, or by evaporating an extract of several drugs to a paste. They always contain sugar, and are eaten from a spoon, or made into small balls ('boluses') and swallowed. Examples are Confections of Senna and Sulphur.

Decocta (Decoctions).—Decoctions are made by boiling the more or less finely-powdered drug with water for five or ten minutes. The liquid is then strained, the insoluble part washed with water, and the washings added to the strained liquid to make a definite volume. Decoctions are simple and compound; they should be freshly made, but 'concentrated decoctions,' of which 1 part is equal to 8 parts of B.P. decoction, are largely used. The dose of decoctions is large, and they often serve as useful vehicles for other drugs. (Note the distinction from Infusions.) Examples are Decoctions of Aloes and Logwood.

Emplastra (Plasters).—These are external applications which are spread upon linen, calico, or other similar material, and applied with heat to the body. The plasters of the B.P. are in solid cylindrical masses, which require melting and spreading with a hot iron. In ordering a plaster, the physician should specify upon what material it is to be spread, and the size to be used.

Extracta (Extracts).—These are solid or semi-solid bodies containing all the soluble portion of the drug in a concentrated form. They vary in consistence, from that of treacle to a hard, brittle substance, and some of them are in powder. The processes used for obtaining them are various. The following are the chief. The student must bear in mind that the object is to exhaust the drug of its soluble matter, and hence the necessity of different solvents for different drugs.

A. Green Extracts.—The juice is pressed out from the perfectly fresh plant, and heated to 130° Fahr.; by this means the green colouring matter (chlorophyll) is coagulated. This is strained off and reserved. The strained fluid is now heated to 200° Fahr. This coagulates albuminous matter (which is useless and would destroy the keeping power of the extract), the fluid is strained, and the albuminous matter rejected. The strained liquid is

now evaporated at 140° Fahr. to the consistence of a syrup, the green colouring matter returned, and the evaporation continued until the extract is of the consistence of a stiff paste.

There are only two official green extracts, those of *Belladonna* and *Hyoscyamus*.

The green colouring matter is of doubtful value as a medicine, and is simply returned to improve the appearance of the extract.

The evaporation of extracts is very largely performed in a vacuum. By this method they can be evaporated at much lower temperatures, and thus risk of burning or decomposition by heat avoided.

B. Fresh Extracts.—The process is the same as that for the green extracts, but in these there is no green colouring matter, so the juice is heated to 212° Fahr., the albuminous matter filtered off, and the evaporation completed as before.

Example.—Extract of *Colchicum*.

C. Aqueous Extracts.—In preparing these the powdered drug is exhausted by percolation, maceration, or a combination of both processes, with cold or boiling water. A solution is thus obtained of the soluble part of the drug; this is evaporated to form an extract.

Examples.—Extracts of *Cascara* and *Opium*.

D. Alcoholic Extracts.—These are made by the same series of operations as in making aqueous extracts, using spirit, or spirit and water, instead of water.

Example.—Extract of Indian hemp.

Some of this class of extracts are made by evaporation of a standardized liquid extract and dilution with sugar of milk, as in the Standardized Extracts of *Belladonna* and *Nux Vomica*.

Some drugs contain a large amount of fat or fixed oil, which is of no value as a medicine; it is therefore removed by washing the powdered drug with ether (which dissolves the oil), and an extract of the residue is then made by the same process as that employed for an alcoholic extract.

The only example is Extract of *Strophanthus*.

This extract and extract of Calabar bean also furnish examples of a modified process used in making some extracts. The liquid obtained by the extraction of the drug is evaporated and mixed with a definite bulk of sugar

of milk, the process thus resembling that used in making the standardized extracts.

E. Dry Extracts.—In these extracts the evaporation is carried to complete dryness, and the residue used in a powdered form.

Example.—Extract of Aloes.

F. Ethereal Extracts.—By percolation (using ether as the menstruum) and evaporation.

There is only one example—Extract of Male Fern.

Extracta Liquida (Liquid Extracts).—These are made by the same processes as the extracts, but the evaporation is conducted in a special manner. A portion of the liquid produced is reserved, and the remainder (after distillation if strong alcohol has been used) evaporated to a soft extract; this is dissolved in the reserved liquid, and the whole, by the addition of alcohol or more menstruum, made to measure a definite bulk. A usual strength of these preparations is 1=1; that is, 1 part of the finished product contains the value of 1 part of the drug.

Important varieties of these preparations are the Standardized Liquid Extracts of Belladonna, Nux Vomica, Ipecacuanha, Cinchona, and Opium. These contain a definite proportion of active ingredients, and are used to prepare the other standardized preparations of the same drugs.

Glycerina (Glycerines).—These are solutions of drugs in glycerine or glycerine and water. They are dense and adhesive preparations, and are therefore very useful when it is desirable to bring a surface under the prolonged action of a drug.

Example.—Glycerine of Tannic Acid.

Infusa (Infusions).—These are usually made by pouring boiling water over the drug or drugs, more or less finely powdered, allowing the mixture to stand for a quarter to half an hour, and straining. A better way is to suspend the drug in the water. Tea is a familiar example of an infusion. Two (calumba and quassia) are made with cold water. Infusions form useful menstrua for other drugs; the dose is usually $\frac{1}{2}$ to 1 or 2 ounces (with one exception, Infusum Digitalis, 2 to 4 drachms). Infusions should be freshly made, but concentrated infusions, of which 1 part is equal to 8 parts of B.P. infusion, are largely used.

Injectiones Hypodermicæ (Hypodermic Injections).—These are solutions of a drug for injection under the skin. Hypodermic solutions must not be acid or contain spirit, and should be made with sterilized—freshly-boiled—distilled water. They may be preserved with a little boric or salicylic acid dissolved in them. The official hypodermic injections are those of Apomorphine, Cocain, Ergot, and Morphine.

Lamellæ (Discs).—These are little discs made of gelatine and water, weighing $\frac{1}{50}$ to $\frac{1}{30}$ of a grain, and containing a very small portion of drug in each. They are also made in sheets, divided into squares, each square representing one lamella. Lamellæ are used for the eye; one is placed in the lower eyelid, where it becomes dissolved and acts upon the organ. Four are official: Atropine, Cocain, Homatropine, and Physostigmine.

Linimenta (Liniments, Embrocations).—These are solutions of drugs prepared by simple mixture, or by the same processes as tinctures. They contain camphor, oil, glycerine, or soap, beside the active drug, and are to be smeared, rubbed, or painted on the skin.

Examples.—Liniments of Calcium (to be smeared), Compound Camphor (rubbed), and Aconite (painted).

Liquores (Liquors, Solutions).—These are solutions of drugs in water, the solutions being assisted, if necessary, by various agents, such as acids, spirit, carbonic acid gas, etc. Solutions of vegetable substances, such as alkaloids, generally require the presence of spirit or some other preservative. The term 'liquor' is often applied to the liquid extracts.

Liquores Concentrati (Concentrated Solutions).—These are liquid extracts of drugs made by repeated percolation with weak alcohol. They are intended to replace the concentrated infusions and decoctions in common use. The usual strength is 1 in 2, and the dose $\frac{1}{2}$ to 2 drachms.

Examples are Concentrated Solution of Calumba and Quassia.

Lotiones (Lotions).—These are solutions or mixtures for external use, and are to be applied by washing or on lint; thus, they differ from most liniments, which are to be rubbed. There are only two in the Pharmacopœia, Yellow and Black Mercurial Lotions; but very many of the drugs in that work are ordered in lotions.

Mella (Honeys).—These are mixtures of honey with some drug. There is but one, Honey of Borax, in the B.P. In this preparation advantage is taken of the sticky, non-poisonous nature of honey to form a preparation to exert local action in the mouth.

Misturæ (Mixtures).—These are made in various ways, the object being to obtain the drug in a convenient and elegant form for internal administration. The process, therefore, alters with the nature of the drug. The following are the outlines of the chief kinds, with hints on dispensing :

Mixtures of Soluble and Miscible Drugs.—In making these, the soluble salts should be dissolved with water or other menstruum in a mortar, or placed in the bottle (with a dry neck), some of the solvent added, the salt dissolved, the other ingredients added, and the bottle filled up.

The official Mixture of Senna may be taken as an example of this form of mixture.

In making up mixtures, the dispenser should on no account mix all the active ingredients together, and then add water. The bottle should be partially filled with water, most of the ingredients added, the bottle nearly filled, and the most active liquid ingredient added last. In this way decomposition or alteration of the ingredients by their reaction upon each other is minimized.

Mixtures of Insoluble and Immiscible Drugs.—The insoluble drugs should be reduced to very fine powder, and, if necessary, powdered gum, tragacanth, or acacia mucilage added, the mixture well triturated in a mortar, and water gradually added, with constant stirring, to the required bulk. Immiscible tinctures may be mixed with diluted acacia or tragacanth mucilage, and water added to the desired volume. In this way substances insoluble or immiscible with water may be ‘suspended.’ Such mixtures, of course, require shaking before each dose is poured out.

The official Mixtures of Guaiacum and Chalk furnish examples.

Emulsions.—These are mixtures of an oil, oleo-resin, or resin, with water, the mixture being effected by means of an ‘emulsifying agent.’ The oil or other substance may be placed in a mortar, powdered gum or mucilage

added, the mixture well stirred, and water gradually added with constant stirring. In this way a white, milky mixture is obtained, in which the particles of oil are finely separated from each other. Emulsions may be also made by shaking the oil with water containing a little tincture of senega, tincture of quillaya bark, or other substances. So-called emulsions are often made by the aid of potash or soda instead of mucilage; they are really soaps, and are extremely nauseous to take.

The official Castor-oil Mixture is an example of an emulsion.

Mucilagines (Mucilages).—These are solutions of gums in water. Two are official—Acacia and Tragacanth. They are much used in making emulsions. Mucilage of Tragacanth is very convenient, as it is so rapidly made.

Oleata (Oleates).—These are semi-solid compounds of metals with oleic acid. The B.P. oleates are those of zinc and mercury, and are made by precipitation. Oleates are useful external agents, being more rapidly absorbed by the skin than ordinary ointments made with lard, etc.

Olea (Oils).—Solution of drugs in fixed oils. There is only one in the B.P., Oleum Phosphoratum. Linimentum Camphoræ is a solution of camphor in oil. (For fixed and volatile oils, see introduction to Part II.)

Oxymella (Oxymels).—This term is applied to preparations containing honey dissolved in acetic acid or an acetum, as in Acetum Scillæ.

Pilulæ (Pills).—The pills of the Pharmacopœia are in the form of more or less stiff pastes, consisting of intimate mixtures of powdered drugs, extracts, etc. The substance used to form the drugs into a paste is called the 'excipient,' and the official excipient is usually Syrup of Glucose (a mixture of glucose and syrup). When required for use, a definite quantity of the pill mass is taken, and divided by a machine into a definite number of the familiar small spherical masses called pills. Each pill should not exceed 5 grains in weight. They may be dusted with chalk, etc., or coated with sugar or gelatine. The official pills are best kept, when possible, in the form of powder, the excipient being added when the pills are required to be made. Glycerine of tragacanth is a very useful excipient for most pills. The dispenser must take care that the pill mass is so divided that each pill contains the required dose of active

ingredient; otherwise he is at liberty to use his own excipient.

Pulveres (Powders).—These are mixtures of dry insoluble substances with sugar and other flavouring or diluting agents. In some cases they are modes of dividing a powerful drug into doses that can be conveniently weighed, as in Compound Powder of Elaterin. Powders are given dry, or stirred into water, or in cachets.

Spiritus (Spirits).—Some of these are simple solutions of volatile oils in spirit (1 in 10), as Spirit of Peppermint, and are used for flavouring; others contain more active drugs, as Spirits of Camphor and Chloroform. The compound spirits are made by distillation, by processes which often involve the decomposition of the alcohol, as in Spirit of Nitrous Ether.

Succi (Juices).—These are the juices pressed out from fresh plants. To the freshly-pressed juice is added one-third the volume of rectified spirit. This precipitates albumen, etc., which are filtered off, and also preserves the preparation.

Examples.—Belladonna, hemlock, hyoseyanus.

Suppositoria (Suppositories).—These are little conical masses, weighing about 15 grains, and made of oil of theobroma (or in one case gelatine and water), and containing some active ingredient. They melt at a low temperature, and are used by introducing one into the rectum; here they are speedily melted and absorbed by the intestine. Hollow suppositories, containing nutritives, are sometimes used.

There are seven official suppositories: Carbolic acid, tannic acid, belladonna, glycerine, morphine, iodoform, and compound lead.

Syrupi (Syrups).—These are solutions of sugar containing some active drug or flavouring agent. Syrups are much used for flavouring, but some of them contain powerful drugs.

Examples.—Syrup of Orange-peel and Iodide of Iron.

Tabellæ (Tablets).—These are small round, flat lozenges containing an active ingredient, and chocolate as a basis. They are not to be sucked like lozenges, but are intended to be quickly eaten.

There is only one—Tablet of Nitroglycerine.

Tincturæ (Tinctures).—These important preparations

may be defined as alcoholic solutions of the soluble matter of drugs. The strength of the alcohol employed for their production depends on the nature of the drug; thus, resinous drugs require strong alcohol for their extraction, and drugs which contain mucilaginous matter, or principles soluble in water, a diluted alcohol. The processes employed to make them are usually those of maceration or percolation, already described; but a few are made by simple solution or mixture of drugs or preparations with alcohol and water.

Examples of tinctures made by the maceration process are those of calumba and catechu; by the percolation process those of aconite and colchicum; and by simple solution or mixture those of iodine, belladonna, and nuxvomica.

Tinctures are Simple or Compound according as they contain one or several drugs.

Trochischi (Lozenges).—These are flat dried masses (round or oval), containing an active ingredient, and gum, sugar, and some flavouring agent. The flavouring agent may be rose-water to form the official ‘rose basis,’ black currant the ‘fruit basis,’ tincture of tolu the ‘tolu basis,’ or no flavouring agent is used, as in the ‘simple basis.’ Sulphur lozenges are flavoured with Tincture of Orange-peel. By means of a lozenge the medicine is brought into continuous contact with the various parts of the mouth and throat, or it may be a means of administering a drug.

Unguenta (Ointments).—These are semi-solid fatty substances, containing some active ingredient or ingredients, mixed with an ointment basis. Ointments are usually intended to exert a local action on some part of the skin, but in some cases absorption takes place and the action is general.

The basis used depends on whether absorption of the drug is desired or not. The animal fats, as lard, wool-fat, etc., are rapidly absorbed; such bases as paraffin ointment, and wax and oil, scarcely at all. The official bases are:

1. *Paraffin Ointment* (hard paraffin 3, soft paraffin 7).—This is made with white soft paraffin for white substances, and with yellow soft paraffin for coloured bodies.

2. *Lard or Benzoated Lard*.—The benzoated lard does not become rancid.

3. *Wax and Oil*.—White wax and almond-oil, yellow wax and olive-oil, or spermaceti and olive-oil.

4. *Hydrous Wool-fat*.—This is wool-fat or 'lanolin' with 30 per cent. of water. It is rapidly absorbed by the skin.

In cases where the drugs are soluble, they are dissolved in the melted basis; when insoluble, they should be levigated to the finest possible powder, and intimately mixed with the melted or warmed basis, and the whole stirred until cold.

Vina (Wines).—Preparations made by macerating or dissolving the drug in sherry, or by dissolving it in orange wine.

Examples.—Antimonial, Iron and Ipecacuanha Wine (sherry), Quinine, and Citrate of iron wine (orange).

Besides the above preparations, which are official, drugs are combined to form :

Bougies.—These are essentially elongated suppositories intended for introduction into the urethra.

Collyria (Eye Lotions).—These are weak solutions or mixtures of drugs, to be either dropped into the eye or applied with an 'eye bath.'

Enemata (Enemas, Clysters).—Liquid preparations for injection into the rectum. They consist of water, soap and water, or mucilage of starch with some drug, and vary in size from 2 ounces to 10 or 20 ounces.

Gargarismata (Gargles).—These are solutions or mixtures of drugs intended to apply to the back of the throat by gargling.

Lincti (Linctuses).—The term 'linctus' is applied to certain mixtures which usually contain syrup, glycerine, or honey, and are meant to be swallowed slowly, in order to affect the throat.

Pessi (Pessaries).—These are large suppositories, which are intended for application to the vagina.

Vapores (Inhalations).—Most volatile drugs may be given by inhalation. A suitable dose is placed in a vessel with boiling water, and the steam which arises, impregnated with the vapour of the drug, inhaled. Or the drug may be placed on some absorbent material, and air drawn through it into the lungs.

The Weights and Measures used in Medicine: Solids by Weight, Liquids by Measure.

There is only one system of weights in common use in British Pharmacy, the Avoirdupois. By this system medicines are compounded, administered, bought and sold. The Pharmacopœia, however, allows the use of two weights not in the avoirdupois system—the *drachm*, 60 grains; the *scruple*, 20 grains.

The Pharmacopœia permits the use of the metric system as an alternative to the avoirdupois in making preparations, but it is not much employed.

Weights.

1 grain (grannum)	-	-	gr. i.
1 scruple (scrupulum)	-	-	ʒi. = 20 grains.
1 drachm (drachma)	-	-	ʒi. = 60 grains.
1 ounce (uncia—oz.)	-	-	= 437·5 grains.
1 pound (libra—lb.)	-	-	℔i. = 7,000 grains.

The sign ʒi. = 1 ounce, when used in prescriptions, is usually understood as the troy ounce of 480 grains.

Measures.

1 minim (minimum)	-	-	mi.
1 drachm (drachma fluida)	-	-	ʒi. = 60 minims.
1 ounce (uncia fluida)	-	-	ʒi. = 8 drachms.
1 pint (octarius)	-	-	℔i. = 20 ounces.
1 gallon (congius)	-	-	℔i. = 8 pints.

It is to be noted that a minim is not the measure of a grain of distilled water; 110 minims = 100 grains.

In Prescribing.

1 teaspoonful	= 1 drachm.
1 dessertspoonful	= 2 drachms.
1 tablespoonful	= 4 drachms (half an ounce).
2 tablespoonfuls	= 1 ounce.

These measures are only approximate, and it must be borne in mind that modern spoons are considerably larger than when these relations were established.

Drops.—Guttæ (gtt.) are generally taken as minims, and should always be measured as such for administration.

All medicines should be given from properly graduated glasses.

Doses.—It is of the utmost importance that the student should remember accurately the doses of the drugs and preparations, especially of those which are powerful or poisonous. No classification can be made of the drugs themselves according to their dose. Each must be remembered individually. Some of the preparations included in this volume may be roughly classified according to their dose as follows:

1. *Waters, Decoctions, Mixtures, and Infusions* (except digitalis) have doses ranging from $\frac{1}{2}$ to 2 ounces.

2. The *Extracts* fall into two classes: (a) Those of the less powerful drugs, as cascara and colocynth, with doses 2 to 8 grains (except Extract of Aloes, 1 to 4); (b) those of the powerful drugs, as opium and belladonna, with doses $\frac{1}{4}$ to 1 grain.

3. *Liquid Extracts* may be arranged thus: 5 to 15 minims—cinchona, hamamelis, and jaborandi; 5 to 30 minims—ergota and opium (and the two official aceta); $\frac{1}{2}$ to 1 drachm—cascara and coca. Exceptions are nux vomica (1 to 3 minims), ipecacuanha ($\frac{1}{2}$ to 20 minims), and male fern (45 to 90 minims).

4. *Pills.*—The dose of pills is 4 to 8 grains, with the following exceptions: Iron pill, 5 to 15 grains; phosphorus, 1 to 2 grains; and soap, lead, and opium, 2 to 4 grains.

5. *Tinctures.*—The tinctures may be arranged in two classes: (a) The less powerful, as Tinctures of gentian, jalap, hyoseyanus, etc., with doses $\frac{1}{2}$ to 1 drachm; with these may be included the concentrated solutions. (b) The powerful tinctures, as opium, belladonna, etc., with doses 5 to 15 minims (except Tincture of Iodine, 2 to 5 minims).

6. *Syrups and Confections* have doses $\frac{1}{2}$ to 1 or 2 drachms.

The doses for children and persons above sixty are less than adult doses. For children under twelve the fraction of the adult dose required is found by this rule: Divide the age in years by the age in years added to twelve. Thus, if the child be eight years old, $8 + 12 = 20$, $\frac{8}{20} = \frac{2}{5}$ of the adult dose. Between twelve and twenty the dose will be between half the full dose and the full dose. It is to be noted that this rule should not be applied to opium, to the action of which children are very susceptible.

The dose of drugs given by hypodermic injection is rather less than when given by the mouth.

Methods of administering Medicines.

Medicines may be given :

By the Mouth, in the form of mixture, pill, powder, and confection.

By the Rectum or Vagina, in the form of injections (enemas), suppositories, and pessaries.

By Injection under the Skin—hypodermic injection. Medicines given in this way act much more rapidly, and, as a rule, more powerfully, than when given by the mouth.

By the Skin :

1. *By Inunction*.—This method is practised sometimes on children; a small piece of mercurial ointment rubbed into certain parts of the body is absorbed, and a general effect produced. It must be remembered, however, that the usual effect of applying ointment to the skin is purely local.

2. *By Painting*.—Certain liquid preparations painted on the skin with a brush produce local or general effects.

3. *By Fumigation*.—Volatile substances (as calomel) are converted into vapour, and the vapour allowed to surround the part, when the pores of the skin absorb the vapour; a general effect is produced.

Medicated baths containing drugs are also often used.

4. *By Plasters*.—Plasters applied to the skin may act mechanically or locally.

5. By the use of lotions, liniments, gargles, washes, dry powders, etc.; the effect is nearly always local.

By Inhalation.—Volatile substances, applied in the form of vapour, are drawn into the lungs, and thus a rapid general effect is produced, as in the administration of chloroform and nitrite of amyl.

Prescribing.

The chief use of the knowledge of practical pharmacy expected from a medical student is to enable him later on to prescribe effectively for his patients. Drugs are amongst the most important weapons used in fighting disease, and in order to wield them efficiently a certain knowledge of

pharmacy is absolutely necessary. The choice of the drug in any particular case depends on a knowledge of pharmacology, and that is beyond the scope of this book; but some advice from the pharmaceutical point of view may be useful here.

The main idea, in prescribing for a patient, is to bring the symptoms under the influence of one particular drug, to which the others ordered are accessory or subordinate. Having, then, chosen this drug, and fixed the dose to be given, with due regard to the age and state of the patient, the prescriber should consider the action of the drug, and whether any part of this needs modifying or restraining by an accessory drug; then its taste, and whether a flavouring agent is desirable; and lastly the vehicle with which the drug or its preparation is to be diluted or dissolved to make a suitable medicine for administration. Suggestions for the prescribing of each drug are given in the text. Much trouble will be saved if the prescription is written for a single dose, and the number to be sent by the dispenser stated on the paper.

Prescriptions are usually written in contracted Latin, the names employed being, where possible, those of the Pharmacopœia. Prescribers should be especially careful to avoid ambiguous contractions; thus, 'Acid. hyd. dil.' might mean either dilute prussic or hydrochloric acid.

The form used in prescription-writing is as follows: The name of the patient is placed at the top of the paper; below this, in the left-hand top corner, the sign \mathcal{R} =take; then follow the names of the drugs, the quantity of each to be used being indicated by the signs for quantities given on p. 22; and lastly, the frequency with which the single dose ordered is to be taken. It is usual for the prescriber to sign his name or initials in the right-hand lower corner of the prescription. The following prescription will illustrate these points:

Mr. J. SMITH.

\mathcal{R} Quinina sulph.	...	...	gr. i.
Acid. hydrochlor. dil.	...	...	\mathfrak{m} x.
Syrupi	...	...	\mathfrak{z} ss.
Aquam	...	...	ad \mathfrak{z} i.
Mitte \mathfrak{z} vii.	Take three times a day.		
Y. Z.			

The same method is employed for pills, powders, etc. A large number of abbreviations are often used in prescriptions for indicating time, and as directions to the dispenser, but for these other books must be consulted.

Students need to be particularly cautioned against incompatibles. These are of two kinds—physical or chemical (a full list of which is given under each drug in the text), and physiological. The latter term is applied to drugs which have an antagonistic physiological action, and a knowledge of them is gained in the study of pharmacology. The simpler a prescription is, after due regard to efficiency and palatability, the better.

Advice to Students.

Students should remember that the study of *Materia Medica* and Pharmacy should be practical, and that it should not be merely crammed from a book. The description of each drug should be read whilst the drug is actually under inspection, and students should accustom themselves to habitually notice the appearance and odour of the drugs they meet with. Odour is especially important, since it is more easily remembered than any other characteristic, and a familiarity with the characteristic odour of a drug is especially useful in connection with Forensic Medicine.

Recognition.—The number of drugs which the student is expected to be able to recognise on inspection is large, and much practice is necessary to succeed in this important branch of the subject. Students who find any difficulty in recognition should provide themselves with a small quantity of each of the drugs marked * in this book, and should practise with them until facility is acquired.* Special characters for recognition are given in the text, and should be carefully compared with the specimens themselves.

Preparations.—The names and composition of the preparations of each drug, together with the strength in active ingredients of those which are powerful or poisonous, must necessarily be learnt off by heart; but

* A complete set of selected typical specimens adapted for the examination may be obtained from Mr. W. M. Holmes, Belgrave Mansions, S.W.

the student is advised to embrace every opportunity of dispensing, and thus becoming practically acquainted with pharmaceutical preparations. Useful practice in the names of preparations is obtained by reading prescriptions.

Incompatibles.—A full list of these is given under each drug. Those of the inorganic drugs should cause no difficulty if the student has a fair knowledge of chemistry; drugs which react or precipitate with each other are usually incompatible. The incompatibles of the organic drugs must be learnt; it is only necessary to remember the most important.

PART I.

INORGANIC SUBSTANCES.

For convenience some of the organic acids are included in this part.

The substances marked * are those the student is expected to recognise. The numbers are for the student's convenience in using his own specimens.

Acidum Aceticum—Acetic acid, acid of vinegar; $\text{HC}_2\text{H}_3\text{O}_2$.

Production.—Prepared from wood by destructive distillation and purification.

Characters.—A colourless liquid, strongly acid, and with a pungent smell. It contains 33 per cent. of real acetic acid, $\text{HC}_2\text{H}_3\text{O}_2$.

There are three acetic acids in the British Pharmacopœia:

Acidum Aceticum (33 per cent. real acetic acid).

Acidum Aceticum Glaciale (about 99 per cent. real acid). This is a powerful caustic, and below 60° Fahr. is a colourless crystalline solid.

Acidum Aceticum Dilutum (1 part of **Acidum Aceticum** with 7 parts of distilled water: 4.27 per cent. real acetic acid). *Dose*: $\frac{1}{2}$ to 2 drachms. This contains nearly the same proportion of acetic acid as vinegar, and may be used as a substitute for it.

Prescribing.—Acetic acid is prescribed diluted with water, both internally and externally. The glacial acid is used as a caustic application to corns, warts, etc.

Acetic acid enters into the composition of several preparations in the Pharmacopœia. The following owe their activity largely to its presence:

Oxymel (honey dissolved in acetic acid and water). *Dose*: 1 to 2 drachms.

Linimentum Terebinthinae Aceticum.—See Turpentine.

Acidum Boricum—Boric acid, Boracic acid; H_3BO_3 .

Production.—Boric acid occurs native in an impure state, and is also produced by the action of sulphuric acid on borax.

Characters.—Colourless, pearly, crystalline plates, greasy to the touch. Taste, slightly sour and bitter.

Soluble in water (1 in 30), in glycerine (1 in 4), in rectified spirit (1 in 30), in boiling water (1 in 3).

Boric acid is usually used in powder; the greasy feel is then very noticeable.

Prescribing.—Seldom used internally; largely used in powder (alone or mixed with chalk or starch), and in solution, and ointment externally.

Dose.—5 to 15 grains.

Preparations.—1. *Unguentum Acidi Borici*—Ointment of Boric Acid (Boric Acid and white paraffin ointment—1 in 10).

2. *Glycerinum Acidi Borici*—Glycerine of Boric Acid (Boric acid dissolved by heat in glycerine—3 in 10).

Acidum Citricum—Citric acid, acid of lemons and linics; $H_3C_6H_5O_7H_2O$.

Production.—Prepared from lime or lemon juice by neutralization with chalk, and decomposition of the calcium compound with sulphuric acid.

Characters.—Colourless crystals, very soluble in water (1 in $\frac{1}{2}$) and in alcohol. Taste, strongly acid.

Citric acid is generally used in powder. Care should be taken to weigh it on a dry surface, as the damp powder is very sticky. Thirty-five grains dissolved in 1 ounce of water, with a few drops of Tincture of Lemon-peel, make a solution in all respects resembling fresh lemon-juice.

Prescribing.—Citric acid is prescribed in powders, to be dissolved in water or in solution.

Dose.—5 to 20 grains.

Lemon-juice and its preparations of course contain citric acid.

Acidum Hydrochloricum—Hydrochloric acid, muriatic acid, 'spirits of salts'; HCl .

Production.—By dissolving hydrochloric acid gas in water. It contains 32 per cent. of HCl .

Characters.—Nearly colourless, very strongly acid liquid, emitting white, suffocating fumes. Rarely prescribed in its undiluted state. Used internally diluted.

Incompatibles.—Nitrate of silver, mercurous, lead, and antimony salts.

Preparations.—*Acidum Hydrochloricum Dilutum*—Dilute Hydrochloric Acid (6 ounces in 1 pint). *Dose*: 5 to 20 minims.

Acidum Nitro-Hydrochloricum Dilutum—Dilute Nitro-Hydrochloric Acid (nitric acid 3, hydrochloric acid 4, water 25). The mixture kept for fourteen days before use. *Dose*: 5 to 20 minims. The mixture is kept for fourteen days in order to develop certain substances, the chief of which are free chlorine and oxy-nitro compounds of chlorine.

Free hydrochloric acid also occurs in several solutions in the Pharmacopœia, where it is used as a solvent.

*1. **Acidum Hydrocyanicum Dilutum**—‘Prussic acid,’ Hydrocyanic Acid; HCN.

Production.—By distilling a mixture of sulphuric acid, water, and ferrocyanide of potassium. The distillate is diluted so as to contain 2 per cent. by weight of prussic acid (HCN).

A stronger acid is sometimes used, known as ‘Scheele’s prussic acid.’ This contains 4 per cent. of HCN. *Dose*: $\frac{1}{2}$ to 2 minims.

Characters.—A colourless liquid, having a very powerful and peculiar odour, suggestive of almonds. It should be kept in small stoppered bottles, which are tied over and inverted, and in a cool dark place.

Recognition.—The smell is quite peculiar, and affords the best means of recognising this very poisonous drug. It should be remembered that the vapour of prussic acid in large quantities is poisonous.

Prescribing.—Prussic acid is generally prescribed in mixtures. It is customary to label mixtures containing it, ‘Shake the bottle.’ It is also used, diluted with water, as a lotion.

Dose.—2 to 6 minims.

Incompatibles.—Silver, copper, and iron salts, oxide and sulphide of mercury.

Prussic acid enters into the composition of *Tinctura Chloroformi et Morphine*—‘Chlorodyne’ ($\frac{1}{2}$ minim in 10). (See Chloroform.)

Prussic acid is produced in large quantities in distilling bitter almonds. Cherry laurel leaves distilled with water

yield prussic acid. The Aqua Lanrocerasi of the Pharmacopœia contains $\frac{1}{6}$ per cent. of the acid. *Dose*: $\frac{1}{2}$ to 2 drachms.

Acidum Nitricum—Nitric acid; HNO_3 .

Production.—By distilling sulphuric acid with a nitrate; it contains 70 per cent. of real nitric acid.

Characters.—Colourless, intensely acid, and corrosive liquid, emitting white, irritating fumes. Strong nitric acid is frequently slightly yellow in colour. The acid destroys the skin, and stains it deep yellow.

Prescribing.—Rarely prescribed internally undiluted. Largely used as a caustic, and given diluted internally.

Preparations.—*Acidum Nitricum Dilutum*—Dilute Nitric Acid (3 ounces and 7 drachms in 1 pint). *Dose*: 5 to 20 minims.

Acidum Nitro-hydrochloricum.—See Hydrochloric Acid.

Free nitric acid occurs in Acid Solution of Nitrate of Mercury.

Acidum Sulphuricum—Sulphuric acid, 'oil of vitriol,' 'vitriol'; H_2SO_4 .

Production.—By the combustion of sulphur, and oxidation and hydration of the resulting sulphurous acid.

Characters.—Colourless oily liquid, intensely acid and corrosive. Gives off much heat when mixed with water. Sulphuric acid is frequently slightly coloured from the presence of organic matter.

Prescribing.—Rarely prescribed undiluted. Sometimes used as a caustic. In preparing the dilute acid, care should be taken to add the acid to the water, not *vice-versâ*. The dilute acid is largely used internally.

Incompatibles.—Lead salts, calcium salts.

Preparations.—1. *Acidum Sulphuricum Aromaticum*—Aromatic Sulphuric Acid (Tincture of ginger, spirit of cinnamon, rectified spirit, and sulphuric acid; mix). Contains 13·8 per cent. of sulphuric acid. *Dose*: 5 to 20 minims.

2. *Acidum Sulphuricum Dilutum*—Dilute Sulphuric Acid (1 ounce $5\frac{1}{4}$ drachms in 1 pint). Contains 13·6 per cent. of sulphuric acid. *Dose*: 5 to 20 minims.

Of these two preparations the Aromatic Sulphuric Acid is slightly the stronger. Largely diluted with water, it is sometimes used as an acid drink; it is also used in the preparation of Infusum Cinchonæ Acidum (1 in 80).

Acidum Sulphurosum—Sulphurous acid ; H_2SO_3 .

Production.—By dissolving sulphurous acid gas in water. Sulphurous acid should contain 6·4 per cent. of H_2SO_3 .

Characters.—A colourless liquid, with an extremely penetrating and suffocating sulphurous odour. Sulphurous acid is a powerful bleaching and disinfecting agent.

Prescribing.—In mixture diluted ; best in association with syrup or Syrup of Orange-peel.

Dose.— $\frac{1}{2}$ to 1 drachm.

Incompatibles.—Permanganate of potash, and all substances which easily yield oxygen.

Acidum Tartaricum—Tartaric acid ; $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$.

Production.—From acid tartrate of potassium, by treatment with chalk and sulphuric acid.

Characters.—Colourless crystals, usually somewhat smaller than citric acid. Soluble freely in water and in rectified spirit. Tartaric acid strongly resembles citric acid in its properties, and, being cheaper, is frequently used to replace it. It is generally prescribed in powders to be taken in water with an alkaline carbonate, so as to form an effervescing mixture.

Dose.—5 to 20 grains.

Preparation.—*Pulvis Sodæ Tartaratæ Effervescens*—‘Seidlitz powder’ (38 grains in each).

*2. **Alumen**—Alum ;

$\text{Al}_2\text{BSO}_4\text{K}_2\text{SO}_4\text{24H}_2\text{O}$, or $\text{Al}_2\text{BSO}_4(\text{NH}_4)_2\text{SO}_4\text{24H}_2\text{O}$.

The term ‘alum’ is applied to a large class of salts having the constitution of a double sulphate with 24 molecules of water. The two alums of the Pharmacopœia are known as potassium alum and ammonium alum ; the former is by far the most common.

Characters.—In large transparent crystals, exhibiting parts of the regular octahedron. Taste, nauseously astringent and acid. Soluble in water (1 in 10) ; like all sulphates of inorganic radicles, it is insoluble in spirit.

Recognition.—Alum in the crystalline state may be recognised by its characteristic shape. If the sample be examined carefully, pieces will be usually found exhibiting more or less perfect faces of the octahedron. In powder, in which form it is generally used in medicine, the peculiar taste will identify it.

Prescribing.—Alum is usually prescribed in solution, as mixture or gargle.

Dose.—5 to 10 grains.

Incompatibles.—Mercury, Iron, Lime, and Lead salts; Alkalies, Tartrates, and Tannic acid, Antipyrin.

Preparation.—*Glycerinum Aluminis*—Glycerine of Alum (1 in 6), Alum dissolved in glycerine with a little water.

Alumen Exsiccatum—Alumen Ustum, Dried Alum, 'Burnt Alum.'—This is potassium alum, from which the water has been driven by heat; 45 per cent. of water is driven off. Roughly speaking, 1 part of dried alum is equal to 2 parts of ordinary alum.

Characters.—Alumen Exsiccatum is in very light, porous, white masses, which have a granular and cracked appearance. It dissolves slowly in water.

Prescribing.—Dried alum is used externally, in the form of fine powder.

***3. Ammonii Carbonas**—Carbonate of Ammonium-Sesquicarbonate of Ammonium.

Production.—By subliming a mixture of chloride of ammonium and carbonate of calcium. It is a variable mixture of acid carbonate (NH_4HCO_3) and carbamate of ammonium ($\text{NH}_2\text{NH}_4\text{CO}_2$).

Characters.—Translucent crystalline masses, smelling strongly of ammonia. Soluble in water (1 in 4); soluble in spirit.

Recognition.—The smell and the translucent appearance of the salt, especially when freshly broken, afford the best means of recognition. Samples which have been much exposed to the air are powdery on the outside.

Prescribing.—Carbonate of ammonium is usually prescribed in solution, and on account of its burning taste should be ordered well diluted.

Dose.—3 to 10 grains as a stimulant and expectorant; 20 to 30 grains as an emetic.

Incompatibles.—Sulphate of Magnesium, Calcium salts, Acids, and Acid Infusions, Syrup and Oxy-mel of Squills.

Preparation.—*Spiritus Ammoniac Aromaticus* ($\frac{1}{2}$ ounce in 1 pint). (See Ammonia.)

***4. Ammonii Chloridum**—Chloride of Ammonium, Sal Ammoniac; NH_4Cl .

Production.—By neutralizing ammonia with hydrochloric acid and evaporating.

Characters.—Translucent fibrous masses (sometimes of large size), without smell. Tough and difficult to

powder. Freely soluble in water (1 in 3) and in rectified spirit.

Recognition.—The peculiar fibrous translucent appearance of sal ammoniac affords the best means of recognising it.

Sal Ammoniac is almost always used in powder in medicine. The best way to powder it is to dissolve the salt in hot water, and evaporate the solution to dryness, constantly stirring. The powder is granular, and has no special features for identification.

Prescribing.—Chloride of Ammonium may be prescribed in powders, to be dissolved in water or in solution. The taste is nauseous, and is best disguised by liquorice. It may also be mixed with common salt and eaten at table.

Dose.—5 to 20 grains.

Incompatibles.—Alkalies and Alkaline Carbonates.

Liquor Ammonia Fortis.—Strong solution of Ammonia, 'Hartshorn,' Liquor Vol. C.C.; NH_4HO .

Production.—By dissolving ammonia gas, NH_3 , in water. Strong solution of Ammonia contains 32.5 per cent. of the gas by weight.

Characters and Prescribing.—A colourless liquid with a very pungent smell; powerfully alkaline. Strong solution of ammonia is powerfully caustic, and is largely used as an application to stings, etc. Its vapour is inhaled in small quantities as a stimulant. Never prescribed internally undiluted.

Preparations.—1. *Liquor Ammoniac*—Solution of Ammonia (Strong solution, 1; distilled water, 2). *Dose:* 5 to 20 minims, largely diluted.

2. *Spiritus Ammoniac Aromaticus*—Aromatic Spirit of Ammonia, 'Sal Volatile.' Essential oils of lemon and nutmeg are distilled with spirit and water, carbonate of ammonium and strong solution of ammonia are dissolved in some of the last portion of distillate, and this solution is mixed with the rest of the distillate (8 ounces of strong solution of ammonia and 4 ounces carbonate in 1 gallon). *Dose:* 20 to 40 minims for repeated administration; 60 to 90 minims for a single dose.

3. *Spiritus Ammoniac Fetidus* Fetid Spirit of Ammonia. Asafoetida is macerated in alcohol, the mixture distilled, and the distillate mixed with strong solution of ammonia (1½ ounces asafoetida and 2 ounces strong solu-

tion ammonia in 1 pint). *Dose*: 20 to 40 minims for repeated administration; 60 to 90 minims for a single dose.

4. *Linimentum Ammoniae*—Liniment of Ammonia, 'Hartshorn and oil.' Almond-oil, 1; olive-oil, 2; solution of ammonia, 1 (1 in 4).

Free Ammonia is also contained in Ammoniated Camphor liniment, and Ammoniated Tinctures of Guaiacum, Opium, Quinine, and Ergot.

Liquor Ammonii Acetatis—Solution of Acetate of Ammonium, 'Mindererus Spirit'; $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$.

Production.—By neutralizing carbonate of ammonium in solution with acetic acid, and diluting.

Characters.—A colourless liquid which, after boiling, should be neutral; has a rapid and nauseous taste. It is a useful solvent for salicylic acid and insoluble salts of lead. It should be stored in bottles free from lead.

Dose.—2 to 6 drachms.

Prescribed in mixtures.

Incompatibles.—Iron salts, Alkalies, and Alkaline Carbonates.

Antimonium Tartaratum—Tartarated Antimony, 'Tartar Emetic,' Potassio-tartrate of Antimony; $(\text{KSbOC}_4\text{H}_4\text{O}_6)_2\text{H}_2\text{O}$.

Production.—By mixing oxide of antimony and bitartrate of potash into a paste with water, allowing to stand, and boiling the paste in water. It is an oxytartrate of antimony and potassium.

Characters.—Colourless transparent crystals with triangular facets. Soluble in water (1 in 17); slightly in dilute spirit. The solution is faintly acid.

Prescribing.—Tartar Emetic may be prescribed in powder, diluted with some more inert substance, in pill, or in solution. Small doses are best given in solution.

Doses.— $\frac{1}{2}$ to $\frac{1}{4}$ grain as a diaphoretic; 1 to 2 grains as an emetic.

The student should carefully note these two doses, and remember that substances with emetic properties have nearly always two ranges of doses.

Incompatibles.—Vegetable Astringent Substances, Lead salts, Alkalies, and Tannic and Gallic Acids (the latter acting as antidotes in poisoning by Tartar Emetic).

Preparation.—*Vinum Antimoniale*—Antimonial Wine

(2 grains in 1 ounce sherry and water). *Dose*: 10 to 30 minims as expectorant; as emetic, 2 to 4 drachms.

Argenti Nitras—Nitrate of Silver, Caustic, 'Lunar Caustic'; AgNO_3 .

Production.—By dissolving silver in dilute nitric acid, and crystallizing.

Characters.—Nitrate of silver is used in two forms: colourless crystals and sticks. The sticks are made by melting the crystals, and cooling the fluid in moulds. The substances are, of course, identical in other respects. Nitrate of silver is very soluble in water (2 in 1); soluble slightly in spirit and in glycerine. It is easily decomposed by contact with organic matter, and should not be kept in corked bottles or the solution filtered through paper. It is a powerful caustic, turning the skin black.

Prescribing.—It may be prescribed in pill (avoiding the use of glycerine or organic matter; the best excipient is kaolin and vaseline) or in solution. Lotions should be applied with a glass rod or brush.

Dose.— $\frac{1}{4}$ to $\frac{1}{2}$ grain.

Incompatibles.—Organic matter, Astringent Infusions, etc., Alkalies and their Carbonates, Chlorides, Acids (except Nitric), Solution of Arsenic, Iodide of Potassium.

Preparations.—1. *Argenti Nitras Mitigatus* 'Mitigated Caustic' (1, Nitrate of silver; 2, nitrate of potassium).—Cast into sticks for convenience in using as a caustic.

2. *Argenti Nitras Induratus*—'Toughened Caustic'—is nitrate of silver with 5 per cent. of nitrate of potassium. It is cast in small points for fitting into cases. It does not break so easily as ordinary caustic.

*5. **Acidum Arseniosum**.—Arsenious Acid, Arsenious Anhydride, 'White Arsenic,' Arsenic, Arsenicum Album; As_2O_3 .

Production.—By roasting arsenical ores, and purifying by sublimation.

Characters.—In large porcelain-like masses, with a stratified, vitreous appearance when broken, or in small dirty-white, heavy crystals, or in a heavy white powder; sublimes by heat, forming brilliant and transparent octahedra. Soluble in water (1 in 100), in boiling water (1 in 10), and in glycerine (1 in 5).

Recognition.—If arsenious anhydride be in masses, its

weight, white, porcelain-like appearance, and glassy fracture enable the student to identify it. It very much resembles in appearance pieces of broken china. The fragments are often of a blackish colour inside. In crystals it requires much practice to recognise it, and in powder this cannot be done with certainty without chemical tests. Even in powder, however, the student should be able to refer it to one of two or three substances of the same appearance.

Prescribing.—Arsenious Acid may be prescribed in pills, for which purpose not less than 1 grain should be weighed and divided, as directed under mercuric chloride. It is, however, best given in solution by means of the official liquors; it should not be given on an empty stomach. Externally in the form of paste as a caustic, and for destroying the nerves in teeth.

Dose.— $\frac{1}{10}$ to $\frac{1}{15}$ grain.

Incompatibles.—Nitrate of Silver, Lime-water, Magnesia, and Salts of Iron.

Preparations.—1. *Liquor Arsenicalis*—Arsenical Solution—‘Fowler’s Solution,’ *Liquor Fowleri* (1 Arsenious acid in 100 of water, with carbonate of potassium and tincture of lavender).

This is simply an alkaline solution of Arsenious Acid coloured with Tincture of Lavender. *Dose*: 2 to 8 minims.

2. *Liquor Arsenici Hydrochloricus*—Hydrochloric Solution of Arsenic (1 Arsenic in 100 water, with hydrochloric acid). *Dose*: 2 to 8 minims.

Note that these solutions are really of the strength 1 grain in 100 fluid grains, or 1 grain in 110 minims. The same remark applies to all the so-called ‘1 per cent.’ solutions of the *Pharmacopœia*.

Arsenii Iodidum.—Iodide of Arsenic, Arsenious Iodide; AsI_3 .

Production.—By the direct combination of iodine and arsenium.

Characters.—Small orange-coloured crystals, soluble in water and in rectified spirit.

Prescribing.—Iodide of Arsenic is always used in solution, and generally as *Liquor Donovanii*.

Dose.— $\frac{1}{10}$ to $\frac{1}{5}$ grain.

Incompatibles.—See below.

Preparations.—*Liquor Arsenii et Hydrargyri Iodidi*.—Solution of Iodides of Arsenic and Mercury, ‘Donovan’s Solution,’ *Liquor Donovanii*.

Production.—By dissolving $87\frac{1}{2}$ grains each of iodide of mercury and iodide of arsenic in sufficient distilled water to make 1 pint of solution. It contains 1 per cent. of each salt.

Characters.—A clear yellow liquid, inodorous, or with slight smell of iodine, and a metallic taste. *Dose*: 5 to 20 minims.

Incompatibles.—Mercuric chloride, Substances containing Free Chlorine, Liquor Bismuthi, Caustic Potash, Spirit of Nitrous Ether (unless quite neutral), Antipyrin.

*6. **Ferri Arsenas**—Arsenate of Iron, Arseniate of Iron.—A mixture of ferrous and ferric arsenates with some iron oxide.

Production.—By mixing solutions of arsenate of sodium, bicarbonate of sodium, and sulphate of iron, and collecting the precipitate.

Characters.—A tasteless, odourless, amorphous powder, of a greenish colour, insoluble in water.

Recognition.—The amorphous nature and peculiar green tint of the salt at once distinguish it. The student must carefully distinguish it from phosphate of iron, which is blue.

Prescribing.—Ferri Arsenas may be ordered in pill, in the same way as arsenious acid (*q.v.*).

Dose.— $\frac{1}{16}$ to $\frac{1}{4}$ grain.

Sodii Arsenas—Arsenate of Sodium, Arseniate of Sodium, the Anhydrous disodium hydrogen arsenate, Na_2HAsO_4 .

Production.—By fusing a mixture of arsenious acid, nitrate of sodium, and dried carbonate of sodium, dissolving in water, filtering and crystallizing. The crystallized salt is then dried at a temperature of 300°F. to form the anhydrous salt.

Characters.—A white powder soluble in water (1 in 6). Solution alkaline.

Prescribing.—Sodii Arsenas is prescribed in solution, in the form of the official liquor.

Dose of the anhydrous salt.— $\frac{1}{16}$ to $\frac{1}{20}$ grain.

Incompatibles.—Nitrate of Silver, Sulphate of Zinc, Chloride of Calcium.

Preparation.—*Liquor Sodii Arsenatis*—Solution of Sodium Arsenate (Freshly-dried arsenate of sodium, 1; water, 100). *Dose*: 2 to 8 minims.

Bismuthi Carbonas — Carbonate of Bismuth, Sub-Carbonate of Bismuth, Oxy carbonate of Bismuth; $(\text{Bi}_2\text{O}_3 \cdot \text{CO}_3)_2 \text{H}_2\text{O}$.

Production.—By precipitating solution of nitrate of bismuth with carbonate of ammonium. It should be noticed that this is an oxy carbonate.

Characters.—A very heavy white granular powder. Insoluble in water; has no taste or smell.

Prescribing.—Carbonate of Bismuth may be prescribed in pill, powders, or in mixture; if in the latter way, it should be suspended by a little acacia mucilage; the use of tragacanth is to be avoided. If the bismuth salt be finely powdered, and the bottle well shaken, no suspending agent is necessary to form a useful mixture.

Dose.—5 to 20 grains.

Incompatibles.—Acids.

Preparation. — *Trochiscus Bismuthi Compositus* — Compound Bismuth Lozenge (Carbonate of bismuth, heavy carbonate of magnesium, precipitated chalk), 2 grains in each. Made with Rose basis.

Bismuthi Subnitrates—Oxynitrate of Bismuth, 'Bismuthum Album,' Subnitrate of Bismuth; $\text{BiONO}_3 \cdot \text{H}_2\text{O}$.

Production.—By dissolving bismuth in nitric acid and pouring the solution into water. It is an oxynitrate.

Characters.—Very heavy white crystalline powder, with an acid reaction. Insoluble in water.

Prescribing.—Subnitrate of Bismuth may be prescribed in pill, powders, or in mixture suspended with acacia gum; the use of tragacanth is to be avoided. Owing to its acid reaction, it should not be prescribed with the alkaline carbonates. The Carbonate of Bismuth is a more useful salt.

Dose.—5 to 20 grains.

Incompatibles.—The Alkaline Carbonates and Bicarbonates.

Bismuth Salicylate.—See Salicylate of Sodium.

Borax.—See Sodium Salts.

Ammonii Bromidum — Bromide of Ammonium; NH_4Br .

Production.—By neutralizing hydrobromic acid with ammonia, evaporating and crystallizing.

Characters.—A granular, white, crystalline powder. Soluble in water (1 in $1\frac{1}{2}$) and in rectified spirit.

Prescribing.—Bromide of Ammonium may be prescribed in powders, to be dissolved in water or in solution.

Dose.—5 to 30 grains.

Incompatibles.—Alkalies, and those of the potassium salt.

***7. Potassii Bromidum**—Bromide of Potassium; KBr.

Production.—By the action of bromine upon solution of potash, evaporation, fusion of the residue with charcoal, and crystallization.

Characters.—Colourless cubical crystals, inodorous; taste saline and pungent. Soluble in water and in rectified spirit.

Recognition.—With some practice, potassium bromide may be recognised by the general appearance of its crystals. No substance (except potassium iodide) that has to be recognised by the student at all resembles it. The crystals of potassium iodide are generally larger and more distinctly cubical than those of potassium bromide; but this is not an invariable rule. The two salts can, of course, be at once distinguished by chemical tests.

Prescribing.—Potassium Bromide is usually prescribed in solution, or the finely powdered salt may be ordered in powders, to be dissolved before taking.

Dose.—5 to 30 grains.

Incompatibles.—Solutions containing free Chlorine or much free acid, Spirit of Nitrous Ether if acid.

Sodii Bromidum—Bromide of Sodium; NaBr.

Production.—By the same process as the potassium salt, using solution of soda instead of potash.

Characters.—Granular, crystalline, white powder, deliquescent, inodorous, soluble in water (1 in 2) and in spirit.

Prescribed in solution.

Dose.—5 to 30 grains.

Incompatibles.—As the Potassium salt.

Calx—Lime, Oxide of Calcium, 'Quicklime'; CaO.

Production.—By calcining chalk or limestone.

Characters.—Compact white or slightly yellow masses, which on contact with water swell with development of heat and fall into powder. This powder is 'Slaked Lime.' The purest lime is that made from marble, and this should alone be used for medicinal purposes. Lime is powerfully caustic, and should be cautiously handled. It is sometimes used alone or mixed with potash as a caustic.

Calcii Hydras—Calcium Hydroxide—Hydrate of Calcium, 'Slaked Lime'; $\text{Ca}(\text{OH})_2$.

Production.—By combining lime with water (slaking).

Characters.—White or slightly yellowish powder, alkaline, soluble in cold water (1 in 900), *less* soluble in hot water, in water, with sugar (1 in 60). Slaked Lime should be kept in bottles carefully closed from the air, as it rapidly absorbs CO_2 , and forms insoluble chalk. It is best freshly made, as it is wanted, by slaking lime.

Prescribing.—Calcium Hydrate is very largely prescribed in solution as 'Lime-water.' It is also applied as a paste with water to the skin, and in solution as lotions and injections.

Incompatibles.—Vegetable and Mineral Acids, Metallic and Alkaline Salts, Tartar Emetic. Some Colouring Matters are precipitated or altered by Lime-water.

Preparations—1. *Liquor Calcis*—Solution of Lime—Aqua Calcis, 'Lime-water.'—Calcium hydrate is washed until free from chlorides, and shaken with distilled water. The clear solution is siphoned off. It is a saturated solution of calcium hydrate ($\frac{1}{2}$ grain in 1 ounce.) *Dose*: 1 to 4 ounces.

Lime-water is used in making *Linimentum Calcis*—Liniment of Lime, Carron Oil (Equal parts of lime-water and olive-oil), and *Lotiones Hydrargyri Flava* and *Hydrargyri Nigra*.

2. *Liquor Calcis Saccharatus*—Saccharated Solution of Lime (A solution of slaked lime and sugar in distilled water—7·11 grains of lime in 1 ounce). *Dose*: 20 to 60 minims.

Calcii Carbonas Precipitatus—Precipitated Carbonate of Calcium, Precipitated Chalk; CaCO_3 .

Production.—By mixing a boiling solution of chloride of calcium with a boiling solution of carbonate of sodium, and collecting and washing the precipitate.

Characters.—A white powder, which when strongly magnified is seen to be crystalline.

Prescribing.—It may be used as a substitute for prepared chalk, for, although crystalline, the particles are too small to be irritating. It is chiefly used externally as a dusting-powder, and as a basis for tooth-powders.

Dose.—10 to 60 grains.

Preparation.—*Syrupus Calcii Lactophosphatis*—Syrup of Lactophosphate of Calcium. Precipitated chalk is dissolved in diluted lactic acid, concentrated phosphoric acid added, then orange-flower-water, and sugar is dissolved in the mixture. *Dose*: $\frac{1}{2}$ to 1 drachm.

Precipitated Chalk is also contained in Bismuth Lozenges, 4 grains in each.

Creta Preparata—Prepared Chalk, Carbonate of Calcium; CaCO_3 .

Production.—Native chalk purified by elutriation.

Characters.—In white conical masses. Amorphous and insoluble in water. The conical shape of the pieces of chalk is due to the method of preparation; while the chalk is in a pasty state it is allowed to drop through a tube, and so assumes the conical shape.

Prescribing.—Chalk is largely prescribed internally in mixtures and powders. A little acacia or tragacanth mucilage is usually employed to suspend it. Chalk is also used externally in the form of powder dusted on the skin.

Dose.—10 to 60 grains.

Incompatibles.—Acids and Sulphates.

Preparations.—1. *Mistura Cretæ*—‘Chalk Mixture’ (Chalk, sugar, tragacanth, cinnamon-water—1 in 32). *Dose*: $\frac{1}{2}$ to 1 ounce.

2. *Pulvis Cretæ Aromaticus*—Aromatic Powder of Chalk—‘Aromatic Confection’ (Chalk, cinnamon, nutmeg, cloves, cardamoms, and sugar in powder, mixed—1 in 4). *Dose*: 10 to 60 grains.

3. *Pulvis Cretæ Aromaticus cum Opio*—Aromatic Powder of Chalk with Opium (1 in 40 of Opium). *Dose*: 10 to 40 grains.

Prepared chalk is employed in making ‘Grey Powder.’ *Hydrargyrum cum Creta* (2 in 3). (See Mercury.)

*8. **Calx Chlorinata**—Chlorinated Lime, Bleaching Powder, ‘Chloride of Lime’; CaOCl_2 .

Production.—By passing chlorine over slaked lime.

Characters.—A white dry powder, smelling strongly of chlorine. Partially soluble in water. Disinfecting and bleaching. Contains 33 per cent. available chlorine.

Recognition.—Calx Chlorinata is at once recognised by its odour of chlorine and general appearance. Not given internally; used chiefly as a disinfectant.

Preparations.—*Liquor Calcis Chlorinatae*—Solution of

Chlorinated Lime (A solution in water, 1 in 10); yields 3 per cent. available chlorine.

Liquor Sodæ Chlorinatæ—Solution of Chlorinated Soda; $\text{NaCl}.\text{NaClO}$.

Production.—By mixing solutions of carbonate of sodium and chlorinated lime, and filtering.

Characters.—A colourless liquid, smelling of chlorine. Alkaline. Taste astringent. Bleaches. Yields $2\frac{1}{2}$ per cent. of available chlorine.

Prescribing.—Internally, diluted with water in mixture, or as a gargle; 1 in 12 is a useful strength. Externally, mixed with glycerine and water as a disinfecting lotion. Solution of Chlorinated Lime may replace it for external use.

Dose.—10 to 20 minims.

Incompatibles.—Acids, Guaiacum preparations, and easily oxidizable bodies.

***9. Cupri Sulphas**—Sulphate of Copper, 'Blue Vitriol,' Blue Stone; $\text{CuSO}_4.5\text{H}_2\text{O}$.

Production.—By dissolving cupric oxide in hot dilute sulphuric acid and crystallizing.

Characters.—In large blue crystals. Taste astringent and metallic. Soluble in water (1 in $3\frac{1}{2}$). Solution acid and caustic. Insoluble in spirit.

Recognition.—It may be recognised by its blue colour and the size and shape of its crystals.

Prescribing.—Sulphate of Copper may be prescribed in pill, solution, and mixture. The pill is the most suitable form for internal use. It is largely used in dilute solution as a caustic lotion or injection. 'Lapis Divinus,' in small blue rods, contains alum, sulphate of copper, and nitre, fused together; it is largely used.

Dose.— $\frac{1}{4}$ to 2 grains as astringent or tonic; 5 to 10 grains as emetic.

Incompatibles.—Vegetable astringents, Alkalies, especially Ammonia, Lime-water, Mineral salts, Iodides, Antipyrin; preparations of free Phosphorus and Hypophosphites.

Ferrum—Iron; Fe_2 .

For making medicinal preparations of iron, iron wire (No. 35), clean iron filings, or wrought-iron nails, may be used. These should be free from rust.

Preparations.—Preparations made direct from metallic iron are as follows (for further particulars see under their respective heads):

Ferri Sulphas.

Liquor Ferri Perchloridi Fortis.

Liquor Ferri Pernitratis.

Syrupus Ferri Iodidi.

Vinum Ferri—Iron wire digested in sherry (1 in 20).

Dose: 1 to 4 drachms. This preparation contains small and variable quantities of citrate, tartrate, and tannate of iron formed by the action of the air and the acids of the wire.

***10. Ferrum Redactum**—Reduced Iron. Powdered Iron'; Fe_2 . Contains about 75 per cent. of metallic iron with oxide.

Production.—By passing hydrogen over heated ferric oxyhydrate.

Characters.—Grayish-black metallic powder. Insoluble in water. Should not give off sulphuretted hydrogen when treated with hydrochloric acid.

Recognition.—Note that the powder is grayish-black, has no taste or smell, is heavy, and when rubbed with a hard body exhibits metallic streaks. It is also strongly attracted by a magnet.

Prescribing.—Reduced Iron may be prescribed in powders or in pills; the former is a usual form, the substance having very little taste.

Dose.—1 to 5 grains.

Preparation.—*Trochiscus Ferri Redacti*—Iron Lozenge (each lozenge contains 1 grain). With the Simple basis.

***11. Ferri Sulphas**—Sulphate of Iron, Ferrous Sulphate, 'Green Vitriol,' 'Green Copperas'; $\text{FeSO}_4\text{H}_2\text{O}$.

Production.—By the action of dilute sulphuric acid on metallic iron, filtering and crystallizing.

Characters.—In small green crystals. Taste styptic and metallic. Soluble in water (1 in less than 2), insoluble in spirit.

Recognition.—Sulphate of Iron may be recognised by the colour and shape of its crystals. No other salt to be recognised resembles it. Crystals which have been much exposed, especially if the air be moist, are often reddish-brown on the outside.

Prescribing.—Sulphate of Iron may be prescribed in pills (the dried sulphate is preferable for this form) or in solution. Solutions keep better if rendered acid with

dilute sulphuric acid, or if a few grains of citric acid be added.

Dose.—1 to 5 grains.

Incompatibles. — (Note: The incompatibles of most Iron Salts are very similar, and the following list applies generally to Ferruginous preparations.) All Astringent Substances; Vegetable Infusions, Decoctions and Tinctures, except those of Quassia and Calumba; Mucilages; Tannic and Gallic Acids, Salicylic Acid and Salicylates, Benzoic Acid and Benzoates, Carbolic Acid, Sulpho-Carbolates; Acetates; Alkalies and their Carbonates, Lime-water, Carbonates of Lime and Magnesia, Morphine; Antipyrin, Sal Volatile.

Preparations.—1. *Mistura Ferri Composita* — Compound Mixture of Iron—'Griffith's Mixture' (Sulphate of iron, carbonate of potassium, myrrh, sugar, spirit of nutmeg, rose-water— $2\frac{1}{2}$ grains in 1 ounce). *Dose*: $\frac{1}{2}$ to 1 ounce.

2. *Ferri Sulphas Exsiccatus*—Dried Sulphate of Iron; $\text{FeSO}_4\text{H}_2\text{O}$.

Production.—By heating sulphate of iron at 212° until 6 molecules of water of crystallization are driven off. The remaining molecule cannot be got rid of at the temperature employed.

Characters.—A dirty-white powder. Soluble in water; insoluble in spirit.

Prescribing.—Dried Sulphate of Iron is prescribed in the form of pills. It should be remembered that 3 grains are equal to 5 grains of undried sulphate.

Dose.— $\frac{1}{2}$ to 3 grains.

Incompatibles.—As Sulphate.

Preparation.—*Pilula Ferri*—Iron Pill, 'Blaud's Pill' (Dried sulphate of iron, dried carbonate of sodium, gum acacia, tragacanth, syrup, water, glycerine). 5 grains contain 1 of Ferrous Carbonate. *Dose*: 5 to 15 grains.

It should be noted that this preparation and the *Mist. Ferri Co.* contain Ferrous Carbonate as their active principle. Dried Sulphate of Iron is also contained in *Pill of Aloes and Iron* (1 in 9).

*12. *Ferri Carbonas Saccharatus*—Saccharated Carbonate of Iron, Ferrous Carbonate and Hydrate with Sugar.

Production.—By mixing solutions of ferrous sulphate

and carbonate of ammonium, washing the precipitate, squeezing it, and mixing it whilst moist with sugar. It contains about $\frac{1}{3}$ anhydrous carbonate of iron (FeCO_3).

The sugar is used to coat the particles of ferrous carbonate and prevent oxidation, but the salt always contains some oxide.

Characters.—Grayish-brown powder or coherent lumps, with a sweet, ferruginous taste. Insoluble in water. Has no odour.

Recognition.—Note the grayish-brown colour and coherent nature of the salt. The colour, absence of odour, and sweet, ferruginous taste are sufficient guides to recognition.

Prescribing.—Saccharated Carbonate of Iron is usually prescribed in powders, the taste is not disagreeable, and is not at all astringent. In pills the salt should be prescribed in the form of *Pilula Ferri*—‘Blaud’s Pills.’

Dose.—10 to 30 grains.

Liquor Ferri Acetatis—Solution of Acetate of Iron, Solution of Ferric Acetate, Peracetate of Iron; $\text{Fe}_2(\text{C}_2\text{H}_3\text{O}_2)_6$.

Production.—By dissolving ferric hydrate in glacial acetic acid and diluting.

Characters.—Dark-red liquid; smell acetous; taste acid and astringent. Miscible with water and spirit in all proportions.

Prescribing.—Solution of Acetate of Iron may be given in mixture. In administering these solutions of iron, all of which are strongly acid and astringent, they should be largely diluted, and the mouth rinsed after each dose; or they may be given by means of a glass tube. It should be remembered that they are apt to derange digestion, and they should not be given when the stomach is empty.

Dose.—5 to 15 minims.

Liquor Ferri Perchloridi Fortis—Strong Solution of Perchloride of Iron, Ferric Chloride; Fe_2Cl_6 .

Production.—By dissolving iron wire in hydrochloric acid and oxidizing with nitric acid.

Characters.—A dark orange-brown liquid; very astringent and acid to the taste. Miscible with spirit and water in all proportions. Contains 22.5 per cent. of metallic iron.

Prescribing.—Strong solution of Perchloride of Iron is not used internally undiluted. It is largely used externally

as a styptic and astringent application, mixed with water or glycerine, and painted on the part, or used in its undiluted state.

Incompatibles.—See Ferri Sulphas.

Preparations.—1. *Liquor Ferri Perchloridi*—Solution of Perchloride of Iron (1 part strong liquor to 3 water).
Dose: 5 to 15 minims.

2. *Tinctura Ferri Perchloridi*—Tincture of Perchloride of Iron—*Tinctura Ferri Sesquichloridi*—Tincture of Steel, 'Steel Drops' (1 part strong solution in 3 of spirit and water).
Dose: 5 to 15 minims.

Note that these two preparations are identical in strength and dose. They are both largely used, and are considered very valuable preparations of Iron. The liquor is the more satisfactory preparation of the two.

Liquor Ferri Pernitratis—Solution of Pernitrate of Iron, Ferric Nitrate; $\text{Fe}_2\text{6NO}_3$.

Production.—By dissolving iron in dilute nitric acid. Contains 3·3 per cent. of iron.

Characters.—Clear reddish-brown solution; acid and astringent.

Prescribing.—As *Liquor Ferri Perchlor.* This preparation is very little used.

Dose.—5 to 15 minims.

Incompatibles.—See Ferri Sulphas.

Liquor Ferri Persulphatis—Solution of Persulphate of Iron, Ferric Sulphate; $\text{Fe}_2\text{3SO}_4$.

Production.—By dissolving ferrous sulphate in water and sulphuric acid, and oxidizing with nitric acid.

Characters.—Dense liquid; colour dark red; no smell, and taste very astringent.

Prescribing.—This preparation is not used either internally or externally. Its use in the Pharmacopœia is to produce ferric hydroxide for the manufacture of the following

Preparations.—*Ferri et Ammonii Citras*, *Ferri et Quinina Citras*, *Ferrum Tartaratum*, and *Liquor Ferri Acetatis*.

*13. **Ferri et Ammonii Citras**—Ammonio-Citrate of Iron, Citrate of Iron and Ammonium.

Production.—By dissolving freshly precipitated ferric hydrate in solution of citric acid, rendering alkaline with ammonia, evaporating the solution to the consistency of syrup, spreading on glass plates, and drying at a tempera-

ture below 100° F. On chipping the salt off the plate it is obtained in the form of 'Scales.'

Characters.—Deep brown, thin, transparent scales. Taste sweetish and astringent. Slightly acid in reaction. Deliquescent. Soluble in water (2 in 1); almost insoluble in spirit.

Recognition.—The colour, general appearance, and sweet taste distinguish this 'scale compound.' It much resembles Ferrum Tartaratum, but is darker in colour, not so shining, and usually in larger scales. Ferrum Tartaratum has little sweet taste.

Prescribing.—Ferri et Ammonii Citras may be prescribed in solution; it is well to dissolve the salt before putting it into the bottle. It belongs to the class of so-called 'scale compounds' of iron. These contain the iron in the *Ferric* state, yet, unlike other ferric compounds, possess scarcely any astringent or acid properties; they are, therefore, very valuable for delicate persons. They may also be prescribed with alkalies without precipitation (except Ferri et Quininæ Citras, in which alkalies precipitate Quinine).

Dose.—5 to 10 grains.

Incompatibles.—See Ferri Sulphas (except alkalies and their carbonates).

Preparation.—*Vinum Ferri Citratis*—Wine of Iron Citrate (8 grains in 1 ounce Orange Wine). *Dose*: 1 to 4 drachms.

***14. Ferrum Tartaratum**—Ferri Potassio Tartras, Tartarated Iron.

Production.—By mixing freshly-precipitated ferric hydrate with acid tartrate of potassium, allowing the mixture to stand, dissolving in water, evaporating and scaling.

Characters.—Thin transparent scales, colour deep red. Taste very slightly sweetish and astringent. Soluble in water (1 in 4), slightly soluble in alcohol.

Recognition.—Note the colour and general appearance. The scales are smaller than those of Ferri et Ammonii Citras, lighter in colour, and not so sweet.

Prescribing.—As Ferri et Ammonii Citras.

Dose.—5 to 10 grains.

Incompatibles.—See Ferri et Ammonii Citras.

***15. Ferri et Quininæ Citras**—Citrate of Iron and Quinine.

Production.—By dissolving freshly-precipitated ferric hydrate and freshly-precipitated quinine in citric acid, adding ammonia, stirring and filtering, evaporating and 'scaling' as before.

Characters.—Greenish golden-yellow scales. Deliquescent. Bitter and ferruginous taste. Soluble in water (2 in 1); the solution slightly acid. Contains 15 per cent. of Quinine.

Recognition.—The general appearance, colour, and bitter taste distinguish this substance from any other the student has to recognise. Compare the three scale compounds, and note the points of difference.

Prescribing.—As *Ferri et Ammonii Citras*.

Dose.—5 to 10 grains.

Incompatibles.—This preparation should not be prescribed with alkalies, which precipitate the quinine. See also under *Ferri Sulphas*.

Syrupus Ferri Iodidi—Syrup of Iodide of Iron.

Production.—By heating iron wire and iodine with water in a flask until the froth becomes white, and filtering while hot into warm syrup. It contains 5·5 grains Iodide of Iron in 1 drachm.

Characters.—Slightly yellow or colourless syrup. Dense. Miscible with water in all proportions. Syrup of Iodide of Iron should be preserved in bottles freely exposed to light, and a stout piece of iron wire should be kept in it. The preparation should be nearly colourless.

Prescribing.—In mixture with water; the taste is nauseous, and it should be well diluted before administration.

Dose.— $\frac{1}{2}$ to 1 drachm.

Incompatibles.—Solutions containing Free Chlorine or much Acid, Lead and Mercuric Salts, Liq. Bismuthi. See also *Ferri Sulphas*.

*16. **Hydrargyrum**—Mercury, 'Quicksilver,' *Argentum Vivum*; Hg.

Characters and Recognition.—Mercury being the only fluid metal, and so largely used, needs no description. For medicinal purposes, it should be quite clean and dry. It may be cleaned by forcing through wash-leather, or passing through a pin-prick in a filter-paper.

Prescribing.—Mercury is largely prescribed mixed with chalk and other substances. These preparations contain

metallic mercury, the globules of which should not be visible to the naked eye, but can be seen with the microscope. In old preparations a good deal of mercurous oxide is present, and this may account for their more energetic action. Mercury may be given by inunction in the form of Mercurial Ointment.

Preparations (for Internal Use)—1. *Hydrargyrum cum Creta*—Mercury with Chalk, 'Grey Powder' (Metallic mercury, chalk; mix—1 in 3). *Dose*: 1 to 5 grains.

2. *Pilula Hydrargyri*—'Blue Pill,' Mercurial Pill (Mercury, confection of roses, liquorice-root in powder—1 in 3). *Dose*: 4 to 8 grains.

Note that these two preparations of metallic mercury have the same strength.

Preparations (for External Use)—1. *Emplastrum Hydrargyri*—Mercurial Plaster (Mercury, olive-oil, sulphur, lead plaster—1 in 3).

2. *Emplastrum Ammoniaci cum Hydrargyro*—Plaster of Ammoniacum with Mercury (Mercury, ammoniacum, olive-oil, sulphur—1 in 5).

3. *Linimentum Hydrargyri*—Mercurial Liniment (Ointment of mercury, ammonia, liniment of camphor—1 in 6).

4. *Unguentum Hydrargyri*—Mercurial Ointment 'Blue Ointment' (Mercury, lard, and suet—1 in 2).

5. *Unguentum Hydrargyri Compositum*—Compound Mercurial Ointment, 'Scott's Ointment' (Ointment of mercury, yellow wax, olive-oil, camphor—1 in 5).

*17. **Hydrargyri Oxidum Flavum**—Yellow Oxide of Mercury, Mercuric Oxide; HgO .

Production.—By mixing solutions of mercuric chloride and caustic soda, and collecting and drying the precipitate.

Characters.—A bright orange-yellow powder; insoluble in water; amorphous.

Recognition.—The bright orange-yellow colour and non-crystalline nature of this salt, together with its weight, serve to distinguish it. It has no smell. The student must remember that this substance is identical in composition with red oxide of mercury, which is crystalline.

Prescribing.—Yellow Oxide of Mercury is rarely given internally. It is largely used in the form of ointment, and, owing to its amorphous nature, is preferable for this purpose to the red oxide.

Preparation.—*Unguentum Hydrargyri Oxidi Flavi*—Ointment of Yellow Oxide of Mercury, 'Golden Ointment' (Yellow oxide of mercury, soft paraffin—1 in 50).

***18. Hydrargyri Oxidum Rubrum**—Red Oxide of Mercury, Mercuric Oxide, 'Red Precipitate,' Hydrargyri Nitrico-oxidum; HgO .

Production.—By heating mercuric nitrate.

Characters.—In heavy orange-red, shining crystals, insoluble in water.

Recognition.—The weight, peculiar orange-red colour, and the shape of its small crystals distinguish this compound.

Prescribing.—Red Oxide of Mercury is rarely used internally. Largely used in the form of ointment; for this purpose the crystals must be rubbed (levigated) to the finest powder before the ointment basis is added.

Preparation.—*Unguentum Hydrargyri Oxidi Rubri*—Ointment of Red Oxide of Mercury—'Red Precipitate Ointment,' Red oxide of mercury, yellow paraffin ointment (1 in 10).

***19. Hydrargyri Subchloridum**—Subchloride of Mercury, Calomelas, Hydrargyri Chloridum, 'Calomel,' Mercurous Chloride; Hg_2Cl_2 .

Production.—By subliming a mixture of mercury, persulphate of mercury, and chloride of sodium.

Characters.—Very heavy, dull white or slightly yellow powder; not crystalline. Insoluble in water, spirit, or ether. Nearly tasteless.

Recognition.—The great weight, dull appearance, and non-crystalline nature of the salt distinguish calomel. The student must be most careful to distinguish 'Calomel,' mercurous chloride, from 'Corrosive Sublimate,' mercuric chloride.

Calomel is non-crystalline, insoluble in water, ether, or spirit. *Dose*: $\frac{1}{4}$ to 5 grains.

Corrosive Sublimate is crystalline, soluble in water, spirit, and ether. *Dose*: $\frac{1}{8}$ to $\frac{1}{16}$ grain.

Prescribing.—Calomel may be prescribed in pills or in powders. Both forms are equally used. It may also be exhibited by fumigation. It is used externally in ointment and in powder.

Dose.— $\frac{1}{4}$ to 5 grains.

Preparations.—1. *Lotio Hydrargyri Nigra*—Black

Mercurial Lotion—'Black Wash' (Calomel, glycerine, mucilage of tragacanth, lime-water; 3 grains in 1 ounce); contains mercurous oxide.

2. *Pilula Hydrargyri Subchloridi Composita*—Compound Pill of Calomel—'Plummer's Pill' (Calomel, sulphurated antimony, guaiacum resin, castor-oil, alcohol—1 in 4½).

3. *Unguentum Hydrargyri Subchloridi*—Calomel Ointment (Calomel, benzoated lard—1 in 10).

*20. **Hydrargyri Perchloridum**—Hydrargyri Corrosivum Sublimatum, Hydrargyri Bichloridum, 'Corrosive Sublimate,' Mercuric Chloride; HgCl_2 .

Production.—By subliming a mixture of persulphate of mercury, chloride of sodium, and black oxide of manganese.

Characters.—Very heavy, colourless, prismatic crystals. Soluble in water (1 in 16), more so in ether (1 in 4), and in spirit (1 in 3). Very easily powdered; the powder exceedingly irritating to the nostril. Highly poisonous.

Recognition.—The great weight and peculiar crystalline appearance distinguish corrosive sublimate. The crystals when freshly broken present a peculiar glassy appearance. Arsenic has the same peculiarity, but is quite different in shape and size.

Prescribing.—Mercuric Chloride may be prescribed in pills. Not less than 1 grain should be weighed (on paper or a glass scale-pan), well mixed with a definite weight of some inert substance, such as sugar of milk, and the mass divided by weighing, so that each pill contains the dose required. It is better given in solution by means of the official liquor. It is also very largely used as an antiseptic in solutions of 1 in 1,000, or weaker. Knives and metallic substances decompose the salt, and should not be placed in contact with it. Baths containing mercuric chloride are also ordered.

Dose.— $\frac{1}{2}$ to $\frac{1}{8}$ grain.

Incompatibles.—Decoction of Bark, Soaps, Acetate of Lead, Nitrate of Silver, Tartar Emetic, Alkalies and their Carbonates, Iodide of Potassium, Lime-water, Antipyrin. Albumin forms an insoluble salt with it, and hence is often used as an antidote. For surgical purposes the coagulation of albumin may be prevented by acidifying the solution with tartaric or hydrochloric acid.

Preparations.—1. *Liquor Hydrargyri Perchloridi*—

Solution of Perchloride of Mercury (Mercuric Chloride, distilled water, $\frac{1}{2}$ grain in 1 ounce). *Dose* : $\frac{1}{2}$ to 1 drachm.

Notice the dose of this preparation.

2. *Lotio Hydrargyri Flava*—Yellow Mercurial Lotion—‘Yellow Wash’ (Mercuric Chloride, 40 grains in 1 pint lime-water); contains yellow mercuric oxide.

Hydrargyrum Ammoniatum—Ammoniated Mercury, ‘White Precipitate,’ Hydrargyri Ammonio Chloridum, Chloride of Mercuric Ammonium; NH_2HgCl .

Production.—By pouring solution of perchloride of mercury into solution of ammonia and collecting the precipitate.

Characters.—In opaque white masses or powder; insoluble in water, spirit, and ether.

Prescribing.—Not used internally. Largely used in the form of ointment and in powder, for external application.

Preparation.—*Unguentum Hydrargyri Ammoniatum*—‘White Precipitate Ointment.’ Ointment of Ammoniated Mercury (Ammoniated mercury, white paraffin ointment—1 in 10).

*21. **Hydrargyri Iodidum Rubrum**—Red Iodide of Mercury, Hydrargyri Biniodidum, Mercuric Iodide; HgI_2 .

Production.—By mixing solution of mercuric chloride and iodide of potassium and collecting the precipitate.

Characters.—In minute vermilion crystals or powder. becoming yellow when gently heated, the colour returning when the powder is rubbed. Insoluble in water, slightly soluble in alcohol, freely in ether and in solution of iodide of potassium.

Recognition.—The brilliant scarlet colour of the salt at once identifies it. Notice the difference in appearance from red mercuric oxide.

Prescribing.—Mercuric Iodide may be prescribed in pill, using the same method as in dispensing mercuric chloride. A very common way of ordering it is in association with iodide of potassium, in solution of which salt it is freely soluble. It is also used in ointment externally.

Dose.— $\frac{1}{32}$ to $\frac{1}{16}$ grain.

Preparations.—1. *Liquor Arsenii et Hydrargyri Iodidi*—‘Donovan’s Solution,’ Liquor Donovanii, Solution of Iodide of Arsenium and Mercury (1 per cent. each of Iodides of Arsenium and Mercury). *Dose* : 5 to 20 minims (see Arsenii Iodidum).

2. *Unguentum Hydrargyri Iodidi Rubri*—Ointment of Red Iodide of Mercury (Red iodide of mercury, benzoated lard, 1 in 25).

Liquor Hydrargyri Nitratis Acidus—Acid Solution of Nitrate of Mercury, Acid Solution of Pernitrate of Mercury.

Production.—By dissolving mercury in diluted nitric acid.

Characters.—A colourless and very strongly acid liquid. Highly caustic, and stains the skin dark brown.

Prescribing.—Not used internally. It is used externally as a caustic application to warts, etc., applied with a glass brush or rod.

Unguentum Hydrargyri Nitratis — Ointment of Nitrate of Mercury, 'Citric Ointment.'

Production.—By dissolving mercury in nitric acid by the aid of heat, pouring the cold solution into a hot mixture of lard and oil, and stirring until cold.

Characters.—A tenacious bright-yellow ointment with a nitrous smell. Citric Ointment must not be stirred or handled with metal knives. It is often of a brown colour from long keeping, and should not then be used.

Preparations.—*Unguentum Hydrargyri Nitratis Dilutum*—Diluted Ointment of Nitrate of Mercury (1 part strong ointment to 4 parts soft paraffin).

Hydrargyri Oleas—Oleate of Mercury.

Production.—By mixing together solutions of oleic acid, hard soap, and mercuric chloride, collecting, washing, and drying the precipitate.

Characters.—A grayish yellow ointment-like body.

Preparation.—*Unguentum Hydrargyri Oleas*—Ointment of Oleate of Mercury—Mercuric oleate, 1; benzoated lard, 3.

*22. **Iodum**—Iodinum, Iodine; I_2 .

Production.—An elementary substance prepared from the ashes of Seaweed.

Characters.—In masses or laminar crystals, with a metallic lustre, emitting a peculiar and suffocating odour and a violet vapour when heated. Slightly soluble in water (1 in 5,000); soluble in rectified spirit (1 in 12), in ether (1 in 4); sparingly in glycerine. Very soluble in solutions of iodide of potassium and chloride of sodium.

Recognition.—Iodine is at once recognised by its peculiar metallic lustre and its suffocating and distinctive odour.

Prescribing.—Iodine is rarely prescribed in its free state ; when so, by means of the tincture well diluted. It is largely used externally, in solution, with iodide of potassium, and in ointments. The vapour is also administered by inhalation. Iodine and its solutions should be kept in stoppered bottles, and not placed in contact with metallic or organic matter. It stains the skin brown.

Incompatibles.—Alkaloids, Antipyrin, Mineral Acids, Metallic Salts, Ammonia, Hyposulphite of Sodium.

Preparations.—1. *Liquor Iodi Fortis*—Strong Solution of Iodine (Iodine, iodide of potassium, water—1 in 10 nearly).

2. *Tinctura Iodi*—Tincture of Iodine (Iodine, iodide of potassium, water, spirit—1 in 40). *Dose* : 2 to 5 minims.

Note the strength of these solutions. The iodide of potassium simply acts as a solvent for the iodine.

3. *Unguentum Iodi* (Iodine, iodide of potassium, glycerine, lard—4 per cent.).

Iodoform (contains about 90 per cent. Iodine ; see Part II.).

***23. Potassii Iodidum**—Iodide of Potassium ; KI.

Production.—By treating solution of potash with iodine, evaporating, heating with charcoal, dissolving in water, and crystallizing.

Characters.—Colourless, opaque, cubical crystals. Soluble in water (4 in 3) ; less soluble in spirit. Solutions should not be exposed to light.

Recognition.—The peculiar cubical appearance of the salt usually distinguishes it. It has occasionally a faint odour of iodine. The crystals are generally larger and more distinctly cubical than those of Potassii Bromidum (*q.v.*).

Prescribing.—Potassii Iodidum is given in solution, usually with a vegetable bitter. It should not be ordered on an empty stomach.

Dose.—5 to 20 grains.

Incompatibles.—Preparations containing Free Chlorine or much Acid, Lead and Mercuric Salts, Spirit of Nitrous Ether (unless quite neutral).

Preparations.—1. *Linimentum Potassii Iodidi cum Sapone*—Liniment of Iodide of Potassium with Soap (Iodide of Potassium, curd soap, glycerine, oil of lemon, water—a stiff jelly—1 in 7 nearly).

2. *Unguentum Potassii Iodidi*—Ointment of Iodide of

potassium (Iodide of potassium, earbonate of potassium, water, benzoated lard—1 in 10).

The earbonate of potassium prevents the ointment from turning yellow on keeping.

Sodii Iodidum—Iodide of Sodium; NaI.

Production.—By the same proecess as the potassium salt, eaustic soda being used instead of potash.

Characters.—Dry, white, crystalline powder. Deliquescent. Taste saline and bitter. Soluble in water and in spirit.

Prescribing.—As Potassium Iodide.

Dose.—5 to 20 grains.

Incompatibles.—Those of Potassium Iodide.

Plumbi Iodidum—Iodide of Lead, Plumbie Iodide; PbI_2 .

Production.—By mixing solution of nitrate of lead and iodide of potassium, and collecting the preeipitate.

Characters.—Brilliant yellow powder or crystalline seales. No smell or taste. Slightly soluble in cold water; more soluble in hot.

Prescribing.—Not used internally. Used in the form of ointment and plaster externally.

Preparations.—1. *Emplastrum Plumbi Iodidi*—Iodide of Lead Plaster (Iodide of lead, resin, lead plaster—1 in 10).

2. *Unguentum Plumbi Iodidi*—Ointment of Iodide of Lead (Iodide of lead, yellow paraffin ointment—1 in 10).

*24. **Magnesii Sulphas**—Sulphate of Magnesium, 'Epsom Salts'; $MgSO_4 \cdot 7H_2O$.

Production.—By dissolving Magnesian Limestone ('Dolomite') in dilute sulphurie acid, filtering, and crystallizing.

Characters.—Small, colourless, and transparent needles. Taste bitter and nauseous. Soluble in water (1 in 1); insoluble in spirit.

Recognition.—Epsom Salts are easily distinguished by the charaeteristie appearance of the crystals. The appearance of sulphate of zine is very similar, but the two salts usually present the following points of difference:

Sulphate of Magnesium is usually slightly damp, the crystals more or less coherent, and not powdery or opaque on the outside.

Sulphate of Zine is usually dry, the crystals less co-

herent, and, if the salt has been much exposed to the air, the crystals are opaque and powdery on the outside.

Chemical tests, of course, at once distinguish them.

Prescribing.—Epsom Salts are usually prescribed in solution; the taste is very nauseous, but is entirely covered by liquorice. An aromatic or carminative should be combined with them to prevent griping.

Dose.—30 to 120 grains for repeated administration; $\frac{1}{4}$ to $\frac{1}{2}$ ounce for a single dose.

Incompatibles.—Nitrate of Silver, Alkaline Carbonates, Lime-water, Acetate of Lead, Alcohol.

Preparations.—1. *Mistura Sennæ Composita*—Compound Senna Mixture—'Black Draught' (1 in 4 Epsom Salts). (See Senna, Part II.)

2. *Magnesiæ Sulphas Effervescens*—Effervescent Sulphate of Magnesium (Dried sulphate of magnesium, bicarbonate of sodium, tartaric and citric acids, sugar—1 in 2); Granular. *Dose*: 1 to 4 drachms for repeated administration, $\frac{1}{2}$ to 1 ounce for a single dose. In making this preparation the Epsom salts are well dried at 130° F., and then mixed well with the other substances. The mixture is heated and stirred at 200° to 220° until it forms into granules, and these are dried at 130°. This is the official process of granulation used in all the granular preparations.

Magnesiæ Carbonas—Carbonate of Magnesium; $(\text{MgCO}_3)_3 \cdot \text{Mg}(\text{HO})_2 \cdot 4\text{H}_2\text{O}$.

Production.—By mixing cold solutions of sulphate of magnesium and carbonate of sodium, and boiling, or by mixing boiling solutions of these two salts, and evaporating to dryness. The precipitate formed in each case is well washed and dried.

Characters.—The student should remember that there are two Carbonates of Magnesium in the Pharmacopœia—*Light Carbonate of Magnesium* (made with cold solutions), *Heavy Carbonate of Magnesium* (made with hot solutions). These are identical in chemical composition, dose, activity, and medicinal action. They simply differ in their bulk. The ratio of bulks for the same weight is as 1 to $3\frac{1}{2}$. The heavy carbonate is to be preferred for medicinal use.

In white powder, granular or slightly crystalline; very little soluble in hot or cold water.

Prescribing.—Carbonate of Magnesium may be pre-

scribed in dry powder or in water. In making mixtures, the heavy carbonate needs only to be placed in the water and the bottle shaken. It may be used to roll pills in.

Dose.—5 to 30 grains for repeated administrations; 30 to 60 grains for a single dose.

Incompatibles.—Acids.

Preparation.—*Liquor Magnesii Carbonatis*—Solution of Magnesium Carbonate—‘Fluid Magnesia’ (By dissolving freshly made carbonate of magnesium in water by means of carbonic acid gas under pressure—10 grains of Carbonate of Magnesium in 1 ounce). *Dose*: 1 to 2 ounces.

Heavy Magnesium Carbonate is also contained in Bismuth Lozenges (2 grains in each).

Magnesia—Calcined Magnesia, Oxide of Magnesium; MgO .

Production.—By calcining either light or heavy Magnesia. There are thus two Magnesias, as there are two Carbonates—*Magnesia Levis*, from the light carbonate; *Magnesia Ponderosa*, from the heavy carbonate. These are identical in all respects but bulk, the ratio of bulk for the same weight being as that for the carbonates. White powders, nearly insoluble in water.

Prescribing.—As Carbonates of Magnesium.

Dose.—5 to 30 grains for repeated administration; 30 to 60 grains for single dose.

It is contained in Compound Powder of Rhubarb. (See Rhubarb.) This may be made with either light or heavy magnesia. The heavy produces the most convenient powder.

***25. Phosphorus**—Phosphorus; P_4 .

Production.—A solid non-metallic element obtained from bone ash.

Characters.—In white or slightly yellow sticks, kept in water. When freshly cut, surface shining and waxy. Luminous in the dark. Exceedingly inflammable. Insoluble in water; soluble in ether, bisulphide of carbon, fixed oils, turpentine, and chloroform.

Recognition.—Phosphorus is at once recognised by its characteristic fumes, great inflammability, and luminous appearance in the dark. Very old samples are frequently red on the outside.

Prescribing.—Phosphorus may be prescribed in pills by means of the official pill mass. A useful form is ‘Perles’

—small capsules of the official oil. The hypophosphites, which contain loosely-combined phosphorus, are believed to be efficient substitutes for free phosphorus.

Dose.— $\frac{1}{10}$ to $\frac{1}{2}$ grain.

Preparations.—1. *Oleum Phosphoratum*—Phosphorized Oil (Phosphorus, almond-oil, heated to 300° and filtered—1 per cent.). *Dose*: 1 to 5 minims.

The oil in this preparation is heated to remove water and other matter which might oxidize the phosphorus.

2. *Pilula Phosphori*—Phosphorus Pill—(Phosphorus, white wax, lard, kaolin, and carbon bisulphide. The phosphorus is dissolved in the carbon bisulphide and mixed with the melted wax and lard, and the kaolin added. When made into pills 3 grains of this mixture are mixed with 1 grain of gum acacia). The pills should be varnished. They contain 2 per cent. of phosphorus. *Dose*: 1 to 2 grains.

Acidum Phosphoricum—Phosphoric Acid; H_3PO_4 .

Production.—By oxidizing phosphorus with nitric acid.

There are two strengths of this acid in the Pharmacopœia:

Acidum Phosphoricum Concentratum—Contains 66·3 per cent of Phosphoric Acid.

Acid. Phosphoricum Dilutum—Contains 13·8 per cent. of Phosphoric Acid, and is made by mixing 3 fluid ounces of the strong acid with enough water to make 1 pint.

Dose.—5 to 20 minims.

Both acids are colourless liquids, the concentrated acid being of syrupy consistency.

Prescribing.—Dilute Phosphoric Acid is prescribed in mixture; it is a useful solvent for sulphate of quinine, and is largely used in combination with that drug.

Incompatibles.—Calcium Salts, Carbonates.

Calci Phosphas—Phosphate of Calcium, Phosphate of Lime; $Ca_3(PO_4)_2$.

Production.—By precipitating a solution of acid phosphate of calcium with ammonia.

Characters.—A white amorphous powder; insoluble in water. Tasteless.

Prescribing.—Calcium Phosphate may be prescribed in powders, or in small doses in pills. It is largely given in combination with other phosphates. 'Parrish's Chemical Food' (Syr. Ferri Phosph. Co.) contains Phosphates of Iron, Calcium, Sodium, and Potassium; it is very largely used.

Dose.—5 to 15 grains.

Preparation.—Used in *Pulvis Antimonialis*—Antimonial Powder, substitute for 'James's Fever Powder.' Pulv. Jacobi (Oxide of antimony 1, calcium phosphate 2).

Dose: 3 to 6 grains.

*26. **Ferri Phosphas**—Phosphate of Iron ;

$\text{Fe}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$. 47 per cent., with some oxide.

Production.—By mixing solutions of ferrous sulphate, sodium phosphate, and sodium bicarbonate, and collecting, washing, and drying the precipitate.

Characters.—A slate-blue amorphous powder, insoluble in water.

Recognition.—The slate-blue colour and non-crystalline nature distinguish this salt. Carefully distinguish it from arsenate of iron, which is green.

Prescribing.—In pills, syrup of glucose making a good excipient, or as the official syrup, or as 'Parrish's Food.' (See Calcium Phosphate.)

Dose.—5 to 10 grains.

Preparations.—1. *Syrupus Ferri Phosphatis*—Syrup of Phosphate of Iron. (Iron wire is dissolved in phosphoric acid and water, and the solution filtered into syrup; water is added to make a definite bulk.) 1 grain of anhydrous Phosphate of Iron in 1 drachm. *Dose:* $\frac{1}{2}$ to 1 drachm.

2. *Syrupus Ferri Phosphatis cum Quina et Strychnina*—Syrup of Phosphate of Iron with Quinine and Strychnine, 'Easton's Syrup.' (By the same process as Syrup of Phosphate of Iron, quinine sulphate and strychnine being also dissolved in the mixture.) 1 grain Phosphate of Iron, $\frac{1}{4}$ grain Sulphate of Quinine, and $\frac{1}{16}$ grain Strychnine, in 1 drachm. *Dose:* $\frac{1}{2}$ to 1 drachm.

Sodii Phosphas—Phosphate of Sodium ;

$\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$.

Production.—By neutralizing solution of acid phosphate of calcium with carbonate of sodium, filtering and crystallizing.

Characters.—Transparent colourless crystals. Efflorescent. Tastes like common salt. Soluble in water (1 in 6).

Prescribing.—Usually in solution in a mixture, or by the effervescing salt. It is often given to children, and may then be ordered in Dill-water.

Dose.— $\frac{1}{2}$ to 2 drachms for repeated administration, $\frac{1}{2}$ to $\frac{1}{2}$ ounce for a single dose.

Incompatibles.—Sulphate of Magnesium, Nitrate of Silver.

Preparation.—*Sodii Phosphas Effervescens*—Effervescent Phosphate of Sodium (Dried sodium phosphate, sodium bicarbonate, tartaric and citric acids—1 in 2); Granulate. *Dose*: 1 to 2 drachms for repeated administration; $\frac{1}{4}$ to $\frac{1}{2}$ ounce for a single dose.

Calcii Hypophosphis—Hypophosphite of Calcium, Hypophosphite of Lime; $\text{Ca}(\text{PH}_2\text{O}_2)_2$.

Production.—By heating phosphorus with slaked lime and water, filtering, separating uncombined lime and crystallizing.

Characters. White pearly crystals. Taste nauseous and bitter. Soluble in water (1 in 8); insoluble in spirit.

Prescribing.—Hypophosphite of Calcium is prescribed in solution. Syrups containing hypophosphites are largely used.

Dose.—3 to 10 grains.

Incompatibles.—Permanganate of Potassium, Nitrate of Silver, Sulphate of Copper.

Sodii Hypophosphis—Hypophosphite of Sodium; NaPH_2O_2 .

Production.—By mixing solutions of hypophosphite of calcium and carbonate of sodium, filtering, and evaporating the filtrate.

Characters. A white granular salt, very much resembling hypophosphite of calcium, but deliquescent, and more soluble in water (1 in 1); soluble in spirit.

Prescribing.—As **Calcii Hypophosphis**.

Dose.—3 to 10 grains.

Incompatibles.—As **Calcii Hypophosphis**.

***27. Plumbi Oxidum**—Oxide of Lead, 'Litharge'; PbO .

Production.—By roasting lead in air.

Characters.—Heavy scales of a pale yellowish-red colour. Insoluble in water.

Recognition.—The weight, colour, and non-crystalline appearance distinguish this salt. It should be noted that it occurs in two distinct forms—heavy scales and powder; the former form is the official. The student must be careful not to confound it with red oxide of mercury, which is crystalline and orange in colour.

Prescribing.—Not used internally. Sometimes used in lotions and ointments.

Preparations.—*Emplastrum Plumbi*—Lead Plaster,

'Diachylon Plaster' (Oxide of lead, olive-oil, water, boiled together until a plaster is formed).

This consists of a lead soap, oleate of lead. It is very largely used, and is contained in all the plasters but those of Menthol, Pitch, and Ammoniacum with Mercury.

***28. Plumbi Acetas**.—Acetate of Lead, 'Sugar of Lead'; $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$.

Production.—By dissolving oxide of lead in acetic acid and crystallizing.

Characters.—In colourless crystals, or in white crystalline masses having an acetous smell. Slightly efflorescent. Taste sweet and astringent. Soluble in water (1 in 2) and in glycerine.

Recognition.—Note that the substance is white, heavy, crystalline, and has a peculiar acetous smell. No other salt to be recognised has the same smell.

Prescribing.—Acetate of Lead may be prescribed in solution or in pills. It is important that the water used for its solution be distilled water, and free from carbonic acid, otherwise a milky mixture results, this may be cleared by the addition of a little acetic acid. Externally in lotions and ointment.

Dose.—1 to 5 grains.

Incompatibles.—Vegetable astringent substances, preparations of Opium, Vegetable Acids, and Albuminous Liquids, Common Water, Mineral Acids and Salts, Alkalies, and Iodide of Potassium.

Preparations.—1. *Glycerinum Plumbi Subacetatis*.—Glycerine of Subacetate of Lead—(Acetate of lead, oxide of lead, glycerine and water, boiled and evaporated).

2. *Unguentum Glycerini Plumbi Subacetatis*.—Ointment of Subacetate of Lead—(Glycerine of subacetate of lead, white paraffin ointment—1 in 6).

These two preparations contain the basic Subacetate of Lead, $\text{Pb}_2\text{O}(\text{C}_2\text{H}_3\text{O}_2)_2$.

3. *Pilula Plumbi cum Opio*.—Pill of Lead and Opium (Acetate of lead, opium in powder, syrup of glucose—1 Opium, 6 Lead Acetate in 8). *Dose*: 2 to 4 grains.

4. *Suppositoria Plumbi Composita*.—Compound Lead Suppositories (Acetate of lead, opium, oil of theobroma—3 grains Lead Acetate, 1 grain Opium in each).

5. *Unguentum Plumbi Acetas*.—Ointment of Acetate of Lead—(Acetate of lead, white paraffin ointment—1 in 25).

Liquor Plumbi Subacetatis Fortis, Strong Solution of Subacetate of Lead, 'Goulard's Extract'; $\text{Pb}_2\text{O}(\text{C}_2\text{H}_3\text{O}_2)_2$ (24 per cent.).

Production.—By boiling acetate of lead, oxide of lead and water together and filtering.

The student must distinguish the basic subacetate of lead which this solution contains from ordinary acetate of lead.

Characters.—A dense, clear, colourless liquid. Alkaline; becomes turbid on exposure to air.

Prescribing.—Not used internally. It is very largely used, diluted with water, in lotions. The water must be distilled, and free from carbonic acid, if a clear mixture is desired. Lotions made with common water, however, are largely used, such should be labelled 'Shake the bottle.'

Incompatibles.—Acacia Mucilage and the bodies mentioned under Plumbi Acetas.

Preparation.—**Liquor Plumbi Subacetatis Dilutus**—Diluted Solution of Subacetate of Lead—'Goulard's Lotion' (Strong solution of subacetate of lead, 2 drachms; rectified spirit, 2 drachms; recently boiled and cooled distilled water to 1 pint—1 in 80).

The spirit should be mixed with the water first.

Potassii Bicarbonas—Bicarbonate of Potassium, Acid Carbonate of Potassium, Hydrogen Potassium Carbonate; KHCO_3 .

Production.—By saturating a strong solution of potassium carbonate with carbonic acid gas, and recrystallizing the salt that separates.

Characters.—Colourless crystals, but nearly always used in medicine in powder. Powder damp, coherent, granular, with a saline taste. Soluble in water (1 in 4), nearly insoluble in alcohol.

Prescribing.—Potassium Bicarbonate can be ordered in solution, or in powders to be dissolved in water. In prescribing effervescing mixtures with citric or tartaric acid, it is useful to remember that 20 grains of the salt neutralize 14 of Citric, 15 of Tartaric Acid.

Dose.—5 to 30 grains.

Incompatibles.—Acids, Subnitrate of Bismuth, Perchloride of Mercury. Syrup of Lemons, and Squills.

Potassii Chloras—Chlorate of Potassium; KClO_3 .

Production.—By passing chlorine into a mixture of

slaked lime, carbonate of potassium and water, boiling, filtering, and evaporating.

Characters.—Colourless crystalline plates, but always used in powder. The powder is granular and lumpy. Taste cool and saline. Soluble in water (1 in 16), scarcely in alcohol.

Prescribing.—Chlorate of Potassium may be given internally in solution. It is largely used in gargles. Useful forms for making use of its local action are pellets of the compressed salt or lozenges.

Dose.—5 to 15 grains.

Incompatibles.—Chlorate of Potassium in the dry state must not be rubbed down with sulphur or sugar. The mixture with sugar is highly inflammable and explosive. Incompatible also with strong acids.

Preparation. — *Trochiscus Potassii Chloratis* — Lozenge of Chlorate of Potassium (3 grains in each) with the Rose basis.

Potassa Caustica—Caustic Potash, 'Potassa,' Hydrate of Potassium KHO.

Production.—By boiling together carbonate of potassium, slaked lime, and water, filtering, evaporating, and fusing.

Characters.—White opaque lumps or sticks. Very deliquescent and corrosive.

Prescribing.—Internally in solution as *Liquor Potassæ*. Externally sometimes used as a caustic in the solid state.

Incompatibles.—Iron and other metallic salts, solution of Bismuth, Sulphate of Magnesium, Infusion of Roses, and most organic substances.

Liquor Potassæ—Solution of Potash.

Production.—May be made by dissolving 27 grains of caustic potash in 1 ounce of distilled water.

Characters.—A colourless liquid, very alkaline, has a soapy feel when rubbed between the fingers.

Prescribing.—In mixtures. Each dose should be well diluted with water before administration. Solution of Potash should be kept in well-stoppered bottles. It often deposits, and should then be filtered through asbestos.

Dose.—10 to 30 minims.

Incompatibles.—See Caustic Potash.

Potassii Sulphas—Sulphate of Potassium; K_2SO_4 .

Production.—Usually by neutralizing acid sulphate of potassium with carbonate of potassium.

Characters.—Colourless hard prisms, but always used

in powder. The powdered particles are very hard, and are useful for grinding vegetable substances to powder. This is its chief use in such preparations as Pulv. Ipecac. Co. Soluble in water (1 in 10), insoluble in spirit.

Prescribing.—Potassium Sulphate may be given internally in solution. It is contained in Pulv. Ipecac. Co. and Pil. Coloc. Co.

Dose.—10 to 40 grains.

Potassii Tartras Acidus—Acid Tartrate of Potassium, Bitartrate of Potassium, 'Cream of Tartar,' 'Purified Argol'; $\text{KHC}_4\text{H}_4\text{O}_6$.

Production.—By purifying the crude 'Tartar' or 'Argol' deposited in wine-casks.

Characters.—A white gritty powder with an acid taste. Sparingly soluble in cold water (1 in 200).

Prescribing.—Cream of Tartar may be ordered suspended in water, but it is usually given in the form of powder or confection. A mixture of sulphur and cream of tartar is largely used.

Dose.—20 to 60 grains.

This is the official dose, but it is often given as a purgative in doses of from 2 to 6 drachms.

It is contained in Confection of Sulphur, Compound Powder of Jalap. and Sulphur Lozenges.

***29. Potassii Permanganas**—Permanganate of Potassium; $\text{K}_2\text{Mn}_2\text{O}_8$.

Production.—By fusing a mixture of chlorate of potassium, caustic potash, and oxide of manganese; boiling the mass in water, saturating with CO_2 , evaporating, and crystallizing.

Characters.—In dark purple prisms, with a peculiar lustre. Rapidly decomposed by organic matter, becoming brown. Soluble in water (1 in 20).

Recognition.—The dark, lustrous, purple colour of the salt, especially when moistened, at once distinguishes this compound. No other substance resembles it.

Prescribing.—Permanganate of Potassium may be given internally in pill or solution; the former is preferable, on account of its nauseous taste. The salt is rapidly decomposed by organic matter, hence the pills must not be made up with glycerine or similar excipient; Ointment of Resin, Vaseline, or Fuller's Earth and water may be used. The pills should be varnished or coated.

Permanganate of Potassium is largely used in solution as an antiseptic and disinfectant, acting by oxidizing the decomposing matter. Solutions should not be filtered through paper, or kept in corked bottles.

Dose.—1 to 3 grains.

Incompatibles.—Acids, Organic Matter, and all Easily Oxidizable Substances, Spirit, Glycerine.

Preparation.—*Liquor Potassii Permanganatis*—Solution of Permanganate of Potassium (1 in 100). *Dose*: 2 to 4 drachms.

Sodii Bicarbonas—Bicarbonate of Sodium; NaHCO_3 .

Production.—By saturating carbonate of sodium with carbonic acid gas.

Characters.—A damp, white powder. Taste saline, not unpleasant. Soluble in water (1 in 11).

Prescribing.—Sodium Bicarbonate is very largely used in solution. It may also be given in powders, to be dissolved in water; or in pellets, to be swallowed. For convenience in ordering effervescing mixtures, remember that 20 grains neutralize 16·7 grains of Citric, 17·8 grains of Tartaric Acid.

When 'Sodæ Carb.' is ordered in prescriptions for internal use, Bicarbonate is generally intended.

Dose.—5 to 30 grains.

Incompatibles.—Acids, Perchloride of Mercury.

Preparations.—1. *Sodii Citro-tartras Effervescens*—Effervescent Citro-tartrate of Sodium (Bicarbonate of Sodium, tartaric acid, citric acid, sugar); Granulate. *Dose*: 1 to 2 drachms.

2. *Trochiscus Sodii Bicarbonatis*—Lozenge of Bicarbonate of Sodium, with Rose basis (3 grains in each).

3. *Pulvis Soda Tartarata Effervescens*—Effervescent Tartarated Soda Powder—'Seidlitz Powder' (Tartarated Soda, 2 drachms; Sodium Bicarbonate, 40 grains, in blue paper: Tartaric Acid, 38 grains, in white paper).

Borax — **Sodii Biboras** — Pyroborate of Sodium; $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$.

Production.—Occurs native. Also by boiling together boric acid and carbonate of sodium.

Characters.—In large transparent, colourless crystals, but always used in powder. Taste saline. Soluble in water (1 in 25), in glycerine (1 in 1); insoluble in spirit. A mild alkali.

Prescribing.—Borax may be given internally in solution; it is not much used in this way. It is largely used as a local application, dissolved in glycerine, or mixed with honey, or in the dry state.

Dose.—5 to 20 grains.

Incompatibles.—Acids, Mucilage of Acacia.

Preparations.—1. *Mel Boracis*—Honey of Borax (Borax in powder, glycerine, honey—1 in $9\frac{1}{2}$).

2. *Glycerinum Boracis*—Glycerine of borax (Borax, glycerine—1 in 7). Owing to the decomposing action of the glycerine, this preparation contains a considerable amount of free boric acid.

Sodii Nitris—Nitrite of Sodium; NaNO_2 .

Production.—By heating nitrate of sodium.

Characters.—White or yellowish crystalline salt; very soluble in water. Deliquescent.

Prescribing.—Nitrite of Sodium may be prescribed in solution. It should be carefully noticed that this salt in large doses is poisonous, being the only sodium salt (besides the arsenate) that is so. The incompatibles should be remembered. Nitrite of Sodium is a powerful remedy, and its use requires caution.

Dose.—1 to 2 grains.

Incompatibles.—Acids.

Sodii Sulphas—Sulphate of Sodium, 'Glauber's Salt'; $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$.

Production.—By neutralizing acid sulphate of sodium with carbonate of sodium, and crystallizing.

Characters.—Colourless, transparent crystals, or masses of crystals. Effloresces on exposure to the air. Freely soluble in water; insoluble in spirit.

Prescribing.—Sulphate of Sodium is prescribed in solution. It is usual to combine it with a carminative. Liquorice covers the bitter taste.

Dose.—30 to 120 grains for repeated administration, $\frac{1}{2}$ to $\frac{1}{2}$ ounce for a single dose.

Preparation.—*Sodii Sulphas Effervescens*—Effervescent Sulphate of Sodium (Dried sulphate of sodium, bicarbonate of sodium, citric and tartaric acids—1 in 2); Granulate. *Dose*: 60 to 120 grains for repeated administration, $\frac{1}{2}$ to $\frac{1}{2}$ ounce for a single dose.

*30. **Sulphur Sublimatum**—Sublimed Sulphur, 'Flowers of Sulphur,' 'Brimstone'; S_2 .

Production.—An elementary substance occurring native, and purified by sublimation.

Characters.—Greenish-yellow, gritty powder; no taste or smell unless heated. Inflammable. Insoluble in water; soluble by heat in fixed oils, carbon disulphide, and turpentine.

Recognition.—Sulphur is recognised by its colour and general appearance. It can be obtained in solid rolls or masses which are crystalline. Sublimed Sulphur must be carefully distinguished from Precipitated Sulphur; the latter is nearly white in colour, and free from grittiness. The two substances are chemically identical, but differ slightly in physical properties.

Prescribing.—Sulphur may be prescribed internally in powder or in mixture, suspended with acacia; it is also taken mixed with syrup or honey. 'Brimstone and Treacle' is a common domestic medicine. Externally sulphur is used in lotions, rubbed down with glycerine and water, in ointments, and in its dry state. The yellow sulphur is to be preferred for medicinal purposes.

Dose.—20 to 60 grains.

Incompatibles.—Chlorate of Potassium in powder.

Preparations.—1. *Confectio Sulphuris*—Confection of Sulphur (Sulphur, acid tartrate of potassium, tragacanth, glycerine, syrup, tincture of orange-peel—1 in 2½). *Dose*: 1 to 2 drachms.

2. *Unguentum Sulphuris*—Sulphur Ointment (Sulphur, benzoated lard—1 in 10).

Sulphur is also contained in Compound Liquorice Powder.

***31. Sulphur Præcipitatum**—Precipitated Sulphur, 'Milk of Sulphur'; S_2 .

Production.—By boiling together sulphur, slaked lime, and water, filtering, treating the filtrate with hydrochloric acid, and collecting the precipitate.

Characters.—A soft, grayish-yellow powder, free from grittiness. Has no taste or smell. Insoluble in water; soluble by heat in fixed oils and turpentine, and in disulphide of carbon.

Recognition.—Precipitated Sulphur may be recognised by its peculiar pale grayish-yellow colour, soft feel, and light weight. The student should compare it with Sublimed Sulphur, and note the difference in colour.

Prescribing.—A useful mixture for children is made by rubbing precipitated sulphur with milk, otherwise it may be given as sublimed sulphur.

Dose.—20 to 60 grains.

Incompatibles.—As Yellow Sulphur.

Preparation.—*Trochiscus Sulphuris*—Sulphur Lozenge (Precipitated sulphur, acid tartrate of potassium, sugar, gum, and tincture of orange-peel—5 grains Sulphur in each).

Calx Sulphurata—Sulphurated Lime, Sulphide of Calcium; CaS (50 per cent.).

Production.—By heating sulphate of calcium with powdered wood charcoal.

Characters.—A dirty-white powder, smelling of sulphuretted hydrogen. Insoluble in water.

Prescribing.—Calcium Sulphide is prescribed in pills, which should be varnished. The pills should contain a small dose ($\frac{1}{10}$ grain), and are to be repeated frequently.

Dose.— $\frac{1}{4}$ to 1 grain.

Potassa Sulphurata—Sulphurated Potash, 'Hepar Sulphuris,' Liver of Sulphur; K_2S (impure).

Production.—By fusing carbonate of potassium and sulphur together.

Characters.—Solid greenish fragments. Liver-brown when freshly broken. Alkaline, and generally smells strongly of sulphuretted hydrogen. Soluble in water, forming a yellow solution. Partially soluble in spirit.

Prescribing.—Not used internally. Externally in ointment and lotions.

Incompatibles.—Acids, Metallic Salts.

Zinci Chloridum—Chloride of Zinc; ZnCl_2 .

Production.—By dissolving metallic zinc in dilute hydrochloric acid, removing any iron or lead present by chlorine, filtering, evaporating, and fusing.

Characters.—White opaque rods or masses. Very deliquescent. Caustic. Almost entirely soluble in water. Soluble in ether and in spirit.

Prescribing.—Chloride of Zinc is not used internally. It is largely used as a caustic in sticks, and as lotions and injections dissolved in water. It is disinfectant, and a solution of it forms 'Burnett's Disinfecting Fluid.' It is very deliquescent, and must not be exposed to air more than is necessary.

Incompatibles.—Nitrate of Silver.

Preparation.—*Liquor Zinci Chloridi*—Solution of Chloride of Zinc (the same process as for making chloride of zinc, the solution being evaporated to a definite bulk or to specific gravity of 1.53).

Zinci Oxidum—Oxide of Zinc, 'Zinc White'; ZnO .

Production.—By calcining carbonate of zinc, or by burning metallic zinc in air.

Characters.—A pure white or slightly yellow powder. Tasteless and inodorous. Insoluble in water.

Prescribing.—Zinci Oxidum may be prescribed internally in pill or powder; the latter is a common form, as the powder is tasteless. It is largely used externally in the form of powder mixed with starch or in lotions with glycerine and water, or in ointments.

Dose.—3 to 10 grains.

Preparation.—*Unguentum Zinci*—Zinc Ointment, Zinc oxide, benzoated lard (3 in 20).

*32. **Zinci Sulphas**—Sulphate of Zinc, 'White Vitriol'; $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$.

Production.—By dissolving zinc in dilute sulphuric acid, removing lead and iron if necessary with chlorine, filtering, evaporating, and crystallizing.

Characters.—Colourless transparent needles. Taste astringent and metallic. Soluble in water (10 in 7). Insoluble in alcohol.

Recognition.—The shape of the crystals, absence of smell, and general appearance distinguish sulphate of zinc. The crystals much resemble those of sulphate of magnesium. For distinction between the two salts, see Sulphate of Magnesium.

Prescribing.—Sulphate of Zinc is used internally in solution or pills. Externally it is largely used in lotions and injections.

Dose.—1 to 3 grains as a tonic; 10 to 30 grains as an emetic.

Incompatibles.—Alkalies and Alkaline Carbonates, Liquor Bismuthi. It does not precipitate with opium, as most metallic salts do.

Preparation.—*Unguentum Zinci Oleas*—Ointment of Oleate of Zinc (Sulphate of zinc and hard soap are dissolved in boiling distilled water, the precipitated oleate is collected, washed, dried, and mixed with melted white soft paraffin, and the mixture stirred until cold).

PART II.

ORGANIC AND VEGETABLE SUBSTANCES.

The drugs in this part are arranged in groups. Those drugs with similar pharmacological properties are placed together.

Section A.—Organic Substances.

Group I.—Alcohol, Ether, Chloroform.

Alcohol Absolutum—Ethylic Alcohol, Alcohol, Absolute Alcohol, Ethyl Hydroxide ; $C_2H_5(OH)$ (99 per cent.).

Production.—The Absolute Alcohol of the Pharmacopœia is made from rectified spirit, by removing the water present with dried carbonate of potassium and chloride of calcium, and distilling.

Characters.—A colourless liquid, with an agreeable ethereal odour. Inflammable. Miscible in all proportions with water. A powerful solvent for most fats, oils, and resins. Should not contain more than 1 per cent. of water.

Prescribing.—Ethylic Alcohol is not often used in its pure state. It acts very powerfully undiluted. Diluted, it is largely ordered in the form of Brandy, etc. A useful mode of prescribing it is in the form of *Mistura Spiritus Vini Gallici* (B.P.). For further uses, see Rectified Spirit. The proportion of absolute alcohol by volume in the most commonly used alcoholic liquors is: Brandy, Rum, Gin, and Whisky, 40 to 50 per cent.; Port and Sherry, 14 to 18 per cent.; Claret and Hock, 8 to 11 per cent. Beers vary largely, according to age and other circumstances, generally between 3 to 6 per cent. *Vinum*

Xericum of the B.P. contains 16 to 17 per cent. ; Vinum Aurantii, 10 to 12 per cent.

*33. **Spiritus Rectificatus**—Rectified Spirit, Alcohol (90 per cent.), Spirit of Wine, S.V.R.

Production.—Obtained by the fermentation of various grains containing sugar, and separation of the alcohol by distillation. It is very largely prepared by fermenting solutions of sugar with yeast.

Characters.—A colourless, transparent liquid ; volatile ; inflammable. Smell pleasant and penetrating ; taste burning. Rectified Spirit should leave no unpleasant smelling substance when evaporated.

This is the substance referred to in the Pharmacopœia as Alcohol (90 per cent.). It contains 90 per cent. by volume of absolute alcohol, or 85·65 per cent. by weight. and it is referred to in the following pages as Rectified Spirit or S.V.R.

Recognition.—The colourless, transparent nature and characteristic smell distinguish rectified spirit. Students must carefully notice the smell, and not confound it with that of other spirituous bodies.

Prescribing.—Rectified Spirit, in its pure state, is not often used internally, but it may be well to remember that, diluted with an equal volume of water, it may serve as a ready substitute for brandy. Externally, spirit is antiseptic and disinfectant. It is used to harden the skin, by rubbing ; in liniments, as a counter-irritant ; and in lotions, with water to form a cooling application.

‘Methylated Spirit’ consists of rectified spirit, to which 10 per cent. of Wood Naphtha and a small quantity of Mineral Naphtha have been added. It is cheap, and may be used as a substitute for rectified spirit in certain liniments and as a preservative for specimens. Owing to the mineral naphtha present, it forms a milky mixture when diluted.

Preparations.—For the manufacture of tinctures and the other preparations which contain alcohol, the Pharmacopœia directs diluted alcohol of various strengths to be employed, as well as the strong (90 per cent.) spirit. Four such diluted alcohols are official, 70 per cent., 60 per cent., 45 per cent., 20 per cent., by volume in each case.

The following is a preparation of alcohol: *Mistura Spiritus Vini Gallici*—Mixture of Brandy (Brandy, cin-

namon-water, sugar, yolks of eggs—about half brandy).
Dose : 1 to 2 ounces.

Incompatibles.—Spirit is incompatible with all inorganic sulphates unless sufficient water is present to dissolve them. Mucilages are precipitated by alcohol.

*34. *Æther*—Ether, Sulphuric Ether, Ethyl Oxide; $(C_2H_5)_2O$ (92 per cent.).

Production.—By distilling sulphuric acid with rectified spirit, and freeing the distillate from water and acid by slaked lime and chloride of calcium.

Characters.—A very light, mobile, colourless, and very volatile liquid. Very inflammable. Odour penetrating and peculiar. Slightly soluble in water.

Recognition.—Note the light weight, mobile and volatile nature, and especially the extremely characteristic smell. The student should compare this body with Chloroform.

Prescribing.—Ether is largely used internally, pure or mixed with spirit (Sp. *Æther*), both diluted with water before administering. It is also largely used by inhalation to produce insensibility; for this purpose the ether (unlike Chloroform) is given mixed with but little air (30 per cent.). The dose by inhalation varies considerably with circumstances (4 drachms to several ounces). Ether is also largely used externally in the form of spray, or on lint to produce local insensibility.

Dose.—10 to 30 minims for repeated administration, 40 to 60 minims for a single dose.

Preparations.—1. *Æther Purificatus*—Purified Ether. This is ordinary ether which has been freed from alcohol and water by lime and chloride of calcium. It is identical with Ether, but has a lower specific gravity. Ether has a specific gravity of .735, *Æther Purus* of .722 to .720. Ether of the latter specific gravity is to be used for producing anæsthesia.

2. *Spiritus Ætheris*—Spirit of Ether (Ether, 1; Rectified Spirit, 2). *Dose* : 20 to 40 minims for repeated administration, 60 to 90 minims for a single dose.

3. *Spiritus Ætheris Compositus*—Compound Spirit of Ether, 'Hoffman's Anodyne.' Made by mixing sulphuric acid with rectified spirit, allowing the mixture to stand for twenty-four hours, and distilling until the temperature rises to $341^{\circ} F$. The denser portion of the distillate is

washed with water, and solution of bicarbonate of sodium; separated, and mixed with ether and alcohol. Hoffman's Anodyne contains Sulphate of Ethyl $(C_2H_5)_2SO_4$, dissolved Ethylene, C_2H_4 , Ether, and other bodies. *Dose*: 20 to 40 minims for repeated administration, 60 to 90 minims for a single dose.

Ether is also used in making Collodium.

*35. **Chloroformum**—Chloroform, Methenyl Chloride, Trichloromethane: $CHCl_3$.

Production.—By distilling a mixture of slaked lime, chlorinated lime, and rectified spirit. The distillate is treated with water, sulphuric acid, alkali, lime, and chloride of calcium successively, redistilled, and to this distillate sufficient absolute alcohol added to make the specific gravity 1.49 to 1.495.

Characters.—A heavy, colourless liquid. Volatile. Not inflammable. Odour sweet and penetrating. Taste sweet and burning. Miscible with alcohol and ether in all proportions; with water (1 in 200); with rectified spirit (10 in 7); also freely with most fixed oils and turpentine.

Recognition.—Chloroform is at once recognised by its weight, volatile nature, and especially extremely characteristic smell. The student should compare its properties with those of Ether.

Prescribing.—Chloroform is very largely used internally in solution as a flavouring and carminative agent. It is also largely used in the form of vapour by inhalation to produce insensibility; for this purpose the vapour is administered largely diluted with air. Externally, chloroform is used to produce local insensibility, and in lotions and liniments as a counter-irritant.

Dose.—1 to 5 minims.

Incompatibles.—Chloroform must not be kept exposed to sunlight, and should be kept in a cool place.

Preparations.—1. *Aqua Chloroformi*—Chloroform Water (Chloroform 1 in water 400). *Dose*: $\frac{1}{2}$ to 2 ounces.

2. *Linimentum Chloroformi*—Chloroform Liniment (Chloroform, Liniment of Camphor equal parts). The Liniment of Camphor prevents too rapid evaporation of the chloroform.

3. *Spiritus Chloroformi*—Spirit of Chloroform, 'Chloric Ether' (Chloroform 1, Rectified Spirit 19—1 in 20,

Dose : 5 to 20 minims for repeated administration, 30 to 40 minims for a single dose.

4. *Tinctura Chloroformi et Morphineæ*—Tincture of Chloroform and Morphine, 'Chlorodyne' (Chloroform, S.V.R., morphine, prussic acid, oil of peppermint, tincture of Indian hemp, tincture of capsicum, glycerine). Ten minims contain Chloroform, $\frac{3}{4}$ minim; Prussic Acid, $\frac{1}{2}$ minim; Morphine, $\frac{1}{11}$ grain. *Dose* : 5 to 15 minims.

Group II.—Chloral, Paraldehyde, Butyl Chloral, Sulphonal.

*36. **Chloral Hydras**—Hydrate of Chloral, Chloral, Trichloraldehyde, Hydrous Chloral; C_2HCl_3O, H_2O .

Production.—By the continued action of dry chlorine on alcohol, purification of the chloral formed, and conversion into hydrate by water.

Characters.—Colourless crystals, or white crystalline masses, which are not deliquescent. Odour pungent and peculiar. Freely soluble in water (1 in less than 1); soluble in rectified spirit, ether, and chloroform. Becomes liquid when rubbed with camphor. Heated with an alkali yields chloroform.

Recognition.—The shape and appearance of the crystals, and the peculiar characteristic smell, distinguish Chloral Hydrate. Butyl Chloral Hydrate, which has a somewhat similar smell, is in very small crystals, and not so soluble in water.

Prescribing.—Chloral Hydrate is sometimes used externally in the form of weak solution. Strong solutions are powerfully caustic. The mixture with camphor (equal parts) is much used externally.

Internally, Chloral Hydrate is given in solution and in the form of the official syrup.

Dose.—5 to 20 grains.

Incompatibles.—Alkalies, Antipyrin.

Preparations.—*Syrupus Chloral*—Syrup of Chloral (Chloral hydrate, water, syrup—10 grains in 1 drachm).

Dose : $\frac{1}{2}$ to 2 drachms.

*37. **Paraldehydum**—Paraldehyde; $C_6H_{12}O_3$.

Production.—A polymer of Aldehyde, prepared by treating aldehyde with gaseous hydrochloric acid or

other reagents. It consists of 3 molecules of aldehyde condensed to $1=3(C_2H_4O)$.

Characters.—A colourless liquid, with an ethereal, unpleasant smell. Taste nauseous and burning. Miscible with water (1 in $8\frac{1}{2}$), and in all proportions with ether and rectified spirit.

Recognition.—The smell is the most distinctive feature. It is extremely disagreeable and penetrating, and does not resemble that of any other drug. The colourless nature of the liquid should also be noticed.

Prescribing.—Paraldehyde is prescribed in solution with water. The taste is unpleasant, and syrup or a flavouring agent, such as Syrup of Orange-peel, should be ordered to disguise it. In ordering Paraldehyde, be careful to order sufficient water to dissolve it.

Dose.— $\frac{1}{2}$ to 2 drachms.

Butyl Chloral Hydras — Croton Chloral Hydrate, Croton Chloral, Hydrous Butyl Chloral, Trichlorobutyli-dene Glycol; $C_4H_5Cl_3O, H_2O$.

Production.—By the continued action of dry chlorine gas on aldehyde, the Butyl Chloral separated by distillation, and converted into the solid hydrous salt by water.

Characters.—White, pearly, crystalline scales. Odour somewhat like that of chloral hydrate, but fainter; it is rather like that of cucumbers. Soluble in water (1 in 50), in glycerine (1 in 1), in rectified spirit (1 in 1). Does not yield chloroform with an alkali.

Prescribing.—Butyl Chloral Hydrate is not used externally. Internally it may be given in powders with sugar, or in pills, or suspended in water, or in small doses, in solution.

Dose.—5 to 20 grains.

Incompatibles.—Antipyrin.

Sulphonal — Sulphonal, Diethylsulphon-dimethyl-methane; $(CH_3)_2C(SO_2C_2H_5)_2$.

Production.—By the interaction of mercaptan and acetone in the presence of hydrochloric acid and oxidation of the 'Mercaptol' formed.

Characters.—Small white crystals and powder. Inodorous and nearly tasteless. Almost insoluble in water (1 in 500), soluble in rectified spirit (1 in 50) and in ether.

Prescribing.—Sulphonal is best given in powder. It should be reduced to the finest possible powder and given

alone, followed by water, or in wafer paper. It takes some time to act, and should be ordered 4 or 6 hours before the effect is required. Sulphonal in small doses may be given in solution in a little spirit and water.

Dose.—10 to 30 grains.

Group III.—Amyl Nitrite, Nitroglycerine, Spirit of Nitrous Ether, Ethyl Nitrite.

In this group must also be included **Nitrite of Sodium** (see page 67).

Amyl Nitris—Nitrite of Amyl; $C_5H_{11}NO_2$. Impure. Consists chiefly of Isoamyl Nitrite.

Production.—By the action of nitrous acid on amylie alcohol, and distillation.

Characters.—A yellow ethereal liquid with a very penetrating and peculiar odour, suggestive of pineapple. Freely soluble in rectified spirit, ether, and chloroform. Almost insoluble in water.

Prescribing.—Amyl Nitrite is rarely used internally by the mouth. It is usually given by inhalation. A dose is placed on a handkerchief and inhaled, or it may be kept in small glass capsules, each containing a dose, which are to be broken before use, and the vapour inhaled.

By patients who habitually need it, it is best kept in a small corked bottle, to avoid delay from a locked stopper.

Dose. (By inhalation.) The vapour of 2 to 5 minims.

Nitroglycerinum—Nitroglycerine, Glonoin, Trinitrin, Glyceryl Trinitrate; $C_3H_5(NO_2)_3O_3$.

Production.—By dropping glycerine into a mixture of sulphuric and nitric acids, pouring into water, and washing the oily liquid, which separates with ice-cold water.

Characters.—Oily, colourless, odourless, sweet liquid. Freely soluble in alcohol, ether, oils, and fats. Almost insoluble in water. Explosive and dangerous to handle.

Nitroglycerine in its pure state is seldom used in medicine; it is generally purchased and used in alcoholic solution, in which form it is not explosive.

Prescribing.—It is given internally in alcoholic solution and in the Tabellæ, the nitroglycerine being first dissolved in oil of theobroma.

Dose.— $\frac{1}{20}$ to $\frac{1}{5}$ grain.

Preparations.—1. *Liquor Trinitrini*—Solution of

Trinitrin (1 Nitroglycerine in 100 Rectified Spirit).
Dose : $\frac{1}{2}$ to 2 minims.

2. *Tabellæ Trinitrini*—Trinitrin Tablets. Nitroglycerine dissolved in oil of theobroma, and chocolate added to make a tablet. Each tablet weighs 5 grains, and contains $\frac{1}{10}$ grain Nitroglycerine. *Dose* : 1 to 2 tablets (quickly eaten).

*38. **Spiritus Etheris Nitrosi**—Spirit of Nitrous Ether, 'Sweet Spirits of Nitre.'

Production.—By distilling a mixture of sulphuric and nitric acids, copper, and rectified spirit.

Characters.—A colourless or slightly yellow liquid. Transparent. Odour penetrating and peculiar, suggestive of apples. Miscible with water. Spirit of Nitrous Ether is a very complex body, containing Ethyl Nitrite up to $2\frac{1}{2}$ per cent., Aldehyde, free Acids, etc. It is nearly always acid, but may be kept neutral by putting a few crystals of potassium bicarbonate in the liquid.

Recognition.—The peculiar apple-like odour is characteristic.

Prescribing.—Spirit of Nitrous Ether is prescribed in mixture. Small doses may be taken dropped on sugar.

Dose.—20 to 40 minims for repeated administration, 60 to 90 minims for a single dose.

Incompatibles.—These apply mostly to Acid Spirit of Nitrous Ether, but even neutral spirit should not be prescribed with the following: Antipyrin, Gallic and Tannic Acids, Iodide of Potassium and other soluble Iodides, Sulphate of Iron. Tincture of Guaiacum, Emulsions.

Liquor Ethyl Nitritis—Solution of Ethyl Nitrite; $C_2H_5NO_2$.

Production.—Ethyl Nitrite is prepared by the interaction of alcohol, sodium nitrite, and dilute sulphuric acid at a low temperature. This is mixed with absolute alcohol and glycerine to form a solution containing 3 per cent. of ethyl nitrite by weight.

Characters.—A colourless liquid with a peculiar apple-like odour. It does not keep very well, and should be stored in small, well-stoppered bottles.

Prescribing.—This preparation is designed to replace Spirit of Nitrous Ether, and may be prescribed in the same way.

Dose.—20 to 60 minims.

Group IV.—Acetanilide, Phenacetin, Antipyrin.

Acetanilidum — Acetanilide, 'Antifebrin,' Phenyl-acetamide; $C_6H_5NHC_2H_3O$.

Production.—By the action of strong acetic acid on aniline, and purification.

Characters.—White, glistening, scaly crystals, without smell. Reaction neutral. Taste pungent. Soluble in water (1 in 200). Freely soluble in rectified spirit.

Prescribing.—Antifebrin may be ordered in powder as Sulphonal, but it is best given in diluted spirit (wine or brandy and water). Not used externally.

Dose.—1 to 3 grains.

Phenacetinum — Phenacetin, Para-acet-phenetidín; $C_{10}H_{13}NO_2$.

Production.—By the action of strong acetic acid on Para-Phenetidin derived from phenol.

Characters.—White, shining, scaly crystals. No taste or smell. Almost insoluble in water. Soluble in rectified spirit (1 in 16).

Prescribing.—Phenacetin is best ordered in powder in the same way as Sulphonal. It may also be given suspended in water with gum or tragacanth.

Dose.—5 to 10 grains.

Phenazonum — Phenazone, 'Antipyrin,' Phenyl-dimethyl-pyrazolone; $C_{11}H_{12}N_2O$.

Production.—Obtained by a series of processes from Phenylhydrazine. Pyrazol is first formed, and this is treated with methyl iodide.

Characters.—White scaly crystals. No smell, and with a very slight bitter taste. Freely soluble in water (1 in 1) and rectified spirit.

Prescribing.—Antipyrin may be prescribed in powders, to be dissolved in water, or in solution.

Dose.—5 to 20 grains.

Incompatibles.—Acids: Carbolic, Hydrocyanic, Nitric, and Tannic; Alum, Arsen. Iodid., Chloral Hydras, Butyl Chloral Hydras, Cupri Sulphas, Decoct. Cinchona, and astringent preparations generally; Hydrarg. Perchlor., Iron preparations, Iodine, Spiritus Etheris Nitrosi Salicylate of Sodium (in powder), Amyl Nitrite (Millard and Stark).

Group V.—Collodion.

Collodium—Collodion.

Production.—By dissolving Pyroxylin, Dinitrocellulose ($C_6H_5(NO_2)_2O_5$) in a mixture of ether and rectified spirit (1 Pyroxylin, 36 Ether, 12 S.V.R.).

Characters.—A syrupy liquid, colourless or slightly yellow, with a strong smell of ether. A drop evaporated leaves a thin, transparent, tough film, insoluble in water and spirit.

Prescribing.—Collodium is used to form an artificial skin on the surface of cuts, wounds, etc. It is a useful adjunct in the post-mortem room.

Preparation.—*Collodium Flexile*—Flexible Collodion (Collodion, Canada balsam, castor-oil).

This liquid on evaporation leaves a film which does not contract on drying, and which is tougher and less soluble than the film of ordinary collodion. Flexible Collodion is to be preferred to common collodion for surgical purposes.

Group VI.—Carbolic Acid, Creosote, Salicylic Acid, Salol, Iodoform.

*39. **Acidum Carbolicum**—Carbolic Acid, Phenol, Phenyl Alcohol; C_6H_5OH .

Production.—Obtained from Coal-tar by fractional distillation.

Characters.—Small colourless, deliquescent crystals, which on keeping often become pink or red. Odour peculiar and tar-like. Caustic, and turns the skin white. Soluble in water (1 in 13), freely in alcohol, fixed oils and fats. Absorbs 10 per cent. water, and remains permanently fluid.

Recognition.—The peculiar odour at once distinguishes carbolic acid.

Prescribing.—Carbolic Acid may be prescribed in pills made with a little inert vegetable powder, or in solution. It is very largely used externally as an antiseptic and disinfectant, in solutions (1 in 20 or 1 in 40), ointments, oils, and on gauze and lint. Carbolic Acid mixed with glycerine, or in its pure liquid state, is sometimes used as a caustic.

Dose.—1 to 3 grains.

Incompatibles.—Antipyrin, Iron Salts, Ammonia.

Preparations.—1. *Acidum Carbolicum Liquefactum*—Liquid Carbolic Acid.

Production.—By adding 10 per cent. of distilled water to carbolic acid.

Characters.—A colourless or reddish liquid, having the odour and taste of carbolic acid. Powerfully caustic. Liquid carbolic acids for disinfecting, of all colours, from black to straw colour, are largely used; they are highly impure, and are not to be used in medicine.

Prescribing.—In solution.

Dose.—1 to 3 minims.

2. *Glycerinum Acidi Carbolic*—Glycerine of Carbolic Acid (Carbolic acid, glycerine—1 in 5).

3. *Suppositoria Acidi Carbolic*—Suppositories of Carbolic Acid—1 grain in each with beeswax and oil of theobroma.

4. *Trochiscus Acidi Carbolic*—Lozenge of Carbolic Acid—1 grain in each with Tolu basis.

5. *Unguentum Acidi Carbolic*—Carbolic Ointment (Carbolic acid, glycerine, white paraffin ointment—1 in 25).

*40. *Creosotum*—Creosote.

Production.—By fractional distillation from wood-tar; consists chiefly of 'Guaiacol'— $C_6H_4(OH)(O.CH_3)$ —and 'Creosol'— $C_6H_3(CH_3(OH)(O.CH_3))$.

Characters.—When fresh, nearly colourless, but soon acquires on keeping a colour ranging from pale yellow to dark reddish-brown. Odour peculiar and tar-like. taste burning and caustic.

Recognition.—The peculiar odour should at once identify creosote. Carefully compare it with that of carbolic acid. The colour varies considerably, and cannot be taken as a characteristic.

Prescribing.—Locally on cotton-wool for toothache, etc. Internally in capsules or in pills (best made with a little soap), or suspended in water by mucilage. The official mixture is useful.

Dose.—1 to 5 minims.

Preparations.—1. *Mistura Creosoti*—Creosote Mixture (Creosote, spirit of juniper, syrup, water—1 minim in 1 ounce). *Dose*: $\frac{1}{2}$ to 1 ounce.

2. *Unguentum Creosoti*—Creosote Ointment (Creosote, hard and soft paraffin—1 in 10).

***41. Acidum Salicylicum**—Salicylic Acid, Hydroxybenzoic Acid; $\text{HC}_7\text{H}_6\text{O}_3$.

Production.—By combining the elements of carbolic acid with those of carbonic acid gas, and purifying; or from natural salicylates (of Methyl) present in the oils of Sweet Birch and Wintergreen.

There are thus two Salicylic Acids: 'natural,' from the natural salicylates; and 'artificial,' from carbolic acid. There has been much discussion as to the relative value of these two forms, but it may now be regarded as settled that, when pure, they are identical in chemical structure and in physiological action.

Characters.—Salicylic Acid occurs in very small white acicular crystals, somewhat resembling quinine sulphate, but with a harsh crystalline feel, or in larger separate crystals, somewhat resembling in size and shape strychnine. It has no smell, but the powder and fine crystals are very irritating to the nostrils. Taste acid and sweetish. Sparingly soluble in water (1 in 500) and in glycerine (1 in 200), soluble freely in alcohol and ether. Soluble also in solutions of acetate and citrate of ammonium, borax and phosphate of sodium.

Recognition.—Compare this substance with Sulphate of Quinine, Strychnine and Benzoic Acid. These are the only three substances to be recognised that at all resemble it. Notice the size of the crystals and their harsh feel. Quinine is smaller and soft, and not irritating to the nostrils. If the salicylic acid is in large crystals, note that the colour and general appearance are different from strychnine crystals. Benzoic acid has usually an aromatic odour, salicylic acid none, and the latter is irritating to the nostrils.

Prescribing.—Salicylic Acid is seldom used internally in its free state, the sodium salt being usually employed—it can be ordered in powders. Externally it is much used in powder, with chalk or starch, and in ointment and plaster. Dissolved in collodion it is a popular remedy for corns; in solution with acetate of ammonium it is used as a paint or lotion.

Dose.—5 to 20 grains.

Incompatibles.—Iron salts.

Preparation.—*Unguentum Acidi Salicylici*—Ointment of Salicylic Acid (Salicylic Acid, white paraffin ointment

—1 in 50). Also contained in Hypodermic Injection of Cocaine.

Sodii Salicylas.—Salicylate of Sodium;
 $(\text{NaC}_7\text{H}_5\text{O}_3)_2\text{H}_2\text{O}$.

Production.—By neutralizing salicylic acid with caustic soda or carbonate of sodium. As there are two acids, there are two sodium salts, 'natural' and 'artificial.' (See Salicylic Acid.)

Characters.—Small white or nearly white crystalline scales, or in powder, or in small crystalline masses; should have no smell; powder irritating to the nose; taste sweet and peculiar; soluble freely in water and spirit.

Prescribing.—Salicylate of Sodium may be ordered in powders, to be dissolved in water or in solution—the latter is most common; not used externally.

Dose.—10 to 30 grains.

Incompatibles.—Acids, Iron Salts, Antipyrin (in powder).

Bismuthi Salicylas—Salicylate of Bismuth.

Production.—By the interaction of bismuth nitrate and sodium salicylate.

Characters.—A whitish, heavy, non-crystalline powder. Insoluble in water, glycerine, or alcohol.

Prescribing.—Internally in powder taken in cachets, or suspended by mucilage in water. Externally, dusted on the skin.

Dose.—5 to 20 grains.

Incompatibles.—As those of Sodium Salicylate.

Salol—Salicylate of Phenol; $\text{C}_6\text{H}_4\text{OH}(\text{COO.C}_6\text{H}_5)$.

Production.—By the interaction of phenol and salicylic acid.

Characters.—A white crystalline powder with a peculiar aromatic odour. Insoluble in water. Soluble in alcohol (1 in 10).

Prescribing.—Mixed with chalk or starch for dusting on the skin; 1 in 5 or 6 is a suitable strength. Internally, in cachets or capsules, or suspended in water.

Dose.—5 to 15 grains.

***42. Iodoformum**—Iodoform Tri-iodomethane; CHI_3 .

Production.—By boiling a mixture of alcohol, water, iodine, and an alkali together. The iodoform separates and is filtered off.

Characters.—Shining bright yellow scales or powder. Odour most peculiar and persistent. The powder has a

greasy feel. The taste is sweetish. It is slightly soluble in rectified spirit and in water. Soluble in chloroform, ether, fixed and volatile oils, and fats.

Recognition.—The colour and remarkable and persistent smell at once identify iodoform.

Prescribing.—Iodoform is seldom used internally; when so, best in pill. Externally it is a valuable antiseptic, and is very largely used in the form of dry powder or a mixture of powder and crystals, dusted on the skin. and in ointments, suppositories and bougies. Iodoform wool and lint are also much employed. Several substances have been used to disguise the odour, but not with complete success. The most efficient is Oil of Geranium, 20 minims to 1 ounce of iodoform.

Dose. $\frac{1}{2}$ to 3 grains.

Preparations.—1. *Suppositoria Iodoformi*—Suppositories of Iodoform (Iodoform, oil of theobroma—3 grains in each).

2. *Unguentum Iodoformi*—Ointment of Iodoform (Iodoform, yellow paraffin ointment—1 in 5).

Section B.—Vegetable Substances.

Definitions.—Besides the Roots, Barks, Leaves, Fruits, Flowers, etc., which are used in medicine, there are certain substances derived from plants which call for a general description. They are:

Alkaloids.—These are substances which are formed in plants, from which they may be extracted by various processes. In the plant they usually exist in combination with an organic acid, and the salts so formed are often soluble in water. Alkaloids, when present, represent usually the active principles on which the medicinal value of the plants depends. The free alkaloids are generally crystalline, colourless bodies, but one or two (e.g., Conine) are liquid. They are sparingly soluble in water, but soluble more or less freely in alcohol, ether, or chloroform. Their reaction is alkaline, and they combine with all the acids to form more or less soluble salts. Chemically they may be regarded as complex ammonias, and nitrogen is thus an invariable constituent. The official names of the alkaloids all end in -ine, as Atropine.

Organic Acids.—Many of these occur in plants in

combination with alkaloids, as Malic Acid with the alkaloids of belladonna, and Meconic Acid with the morphine in opium. Some are combined with inorganic bases, such as calcium, in the form of crystals ('Raphides') in plants; and some occur free, as Citric Acid in lemons.

Glucosides.—These bodies resemble in some properties the alkaloids, but they are not necessarily nitrogenous, and, unlike the alkaloids, when boiled with dilute acids (*e.g.*, 2 per cent. sulphuric), or under the influence of certain unorganized ferments or 'Enzymes,' decompose, and yield glucose and some other substance. Thus, 'Salicin' boiled with dilute sulphuric acid yields Glucose and 'Saligenin.'

Gums.—These are dried exudations from the stems of plants. Chemically they appear to be closely allied to Cellulose, from which they are probably derived; many of them, however, are in combination with an inorganic base, such as calcium. For convenience they are divided, according to their solubility in water, into 'Arabins,' soluble; 'Bassorins,' partially soluble; and 'Cerasins,' insoluble gums. They are insoluble in alcohol. Solutions of gums are called 'Mucilages.'

Neutral and Bitter Principles.—These names are applied to certain substances which, being neither glucosides nor alkaloids, have usually a bitter taste, and form the active principles of many drugs. Quassin, the active principle of quassia-wood, is an example.

Fixed Oils and Fats.—These substances are solid, semi-solid, or liquid. They may be obtained from parts of plants (usually seeds or fruits) by pressure, 'expression,' or by heat and pressure. Oils expressed without heat are called 'cold-drawn.' Fixed oils or fats *e.g.*, lard—are also found in animal tissues. Chemically they mainly consist of the radical glyceryl, C_3H_5 , in combination with Oleic, Palmitic, Stearic, and other fatty acids. When treated with alkalies or metallic oxides they form soaps, and glycerine is set free; this reaction is called 'Saponification.' Fixed oils have little or no smell, are immiscible with water, except in the form of 'Emulsions' (*q.v.*), and cannot be distilled without decomposition.

NOTE.—The student must carefully distinguish vegetable fats and oils from mineral fats and oils, such as 'Vaseline,' Paraffin Molle, and 'Mineral oil.' These

are not compounds of fatty acids, but contain simply carbon and hydrogen in varying proportions; they cannot be saponified, do not yield glycerine or become rancid from decomposition, and can, at high temperatures, be distilled unchanged.

Volatile Oils.—These substances, which may be liquid or solid, are contained in many vegetable drugs, and generally constitute the odoriferous and aromatic part of the drug. Their constitution is variable and complex, and they may contain various Aldehydes, Ketones, Alcohols, and Ethereal Salts, and in most of them one or more of these is associated with some form of 'Terpene'— $C_{10}H_{16}$. Thus, they in no way resemble, chemically, fixed oils, do not saponify, and can be distilled or sublimed unchanged. The solid oils, which usually contain oxygen, are often spoken of as 'Stearoptenes'; the liquid, 'Elaoptenes.'

The student should carefully notice the differences, chemical and physical, between fixed and volatile oils.

Resins.—These are substances which are generally regarded as volatile oils which have become oxidized. They are solid, non-volatile, brittle substances, insoluble in water, soluble in strong alcohol. Many of them are acid, and form soluble compounds ('Resin soaps') with alkalies. They may be emulsified like the fixed oils.

Gum Resins.—These are mixtures of gum and resin, and generally a little volatile oil. They can be usually at once made into an emulsion by rubbing down in a mortar with a little water, the gum suspending the resin.

Oleo Resins.—These are solutions of resin in volatile oil. Crude turpentine, as it exudes from the tree, is an example. On distilling an oleo resin, the volatile oil distills off, and the resin is left behind. Oleo resins may be emulsified in the same way as fixed oils.

Balsams.—Balsams are oleo resins which contain either Cinnamic or Benzoic Acid, or both. They are aromatic, and generally more complex in constitution than ordinary oleo resins. Balsams may be emulsified in the same way as fixed oils.

Group VII.—Aconite.

*43. **Aconiti Radix**—Aconite Root, 'Monkshood' Root.

Production.—The dried root of *Aconitum Napellus*, collected from plants grown in Britain.

Characters.—Dark-brown, tapering roots, 2 or 3 inches long and $\frac{1}{2}$ to $\frac{3}{4}$ inch thick. The thicker end is usually crowned with the remains of the stem. Whitish within. Has no smell, and when chewed excites a sensation of tingling and numbness.

Recognition.—Note that the drug is in single roots, which are tapering, and have usually a crown at the upper end formed of the remnant of the stem; that the roots are black or dark brown, and have no smell. Compare a root with a narrow piece of jalap, and notice that jalap has no crown, and differs much in general appearance.

Composition.—Aconite contains a very powerful poisonous alkaloid, 'Aconitine,' about .03 per cent.; 'Aconitic Acid,' an organic acid related to citric acid; and two other alkaloids, 'Aconine' and 'Pieraconitine.'

Prescribing.—Preparations of aconite root are used both externally and internally. Internally, Aconite is best given in small and repeated doses; for example, a drop of the tincture every ten minutes for an hour, and subsequently hourly. For external use the Liniment is painted on the skin. It is very poisonous.

Preparations.—1. *Linimentum Aconiti*—Liniment of Aconite (Aconite Root, 1; rectified spirit, $1\frac{1}{2}$; with camphor. By maceration and percolation).

2. *Tinctura Aconiti*—Tincture of Aconite (Aconite Root; alcohol, 70 per cent.; Percolation 1 in 20). *Dose*: 5 to 15 minims; or, if frequently repeated, 2 to 5 minims.

Aconitina.—Aconitine, Aconitia; $C_{33}H_{47}NO_{12}$.

Production.—An alkaloid prepared from aconite root.

Characters.—Colourless crystals, which when magnified present a characteristic hexagonal shape. Soluble in alcohol; nearly insoluble in water. A very small quantity produces a persistent tingling on the tongue or lips. An extremely powerful poison.

Prescribing.—Very rarely used internally; externally

with care, as the ointment, or in very dilute alcoholic solution.

Preparation.—*Unguentum Aconitinæ*—Ointment of Aconitine (Aconitine, oleic acid, lard—2 per cent.).

The Aconitine is dissolved in the oleic acid, and the solution mixed with the lard. This process ensures the proper distribution of the alkaloid, and is used for all those official ointments containing an alkaloid.

Group VIII.—Opium, Morphine, Codeine.

*44. **Opium**—Opium, Gum Opium, 'Thebaicum.'

Production.—Opium is the dried juice obtained from the unripe capsules of *Papaver Somniferum*. Whilst the capsules are unripe and growing on the stems, incisions are made round them, the juice oozes out, is allowed partially to dry, scraped off, and worked into masses of various size.

Characters.—There are a great many varieties of opium, and they differ considerably in appearance, according to the place they come from. For the preparation of the Tincture and Extract of Opium, the Pharmacopœia permits any variety of opium to be used, provided it contains when dried not less than $7\frac{1}{2}$ per cent. of anhydrous morphine; but for all other medicinal purposes opium must contain when dried between $9\frac{1}{2}$ and $10\frac{1}{2}$ per cent. of anhydrous morphine.

Opium of such quality as this is usually seen in commerce in two forms, which are known as:

(a) *Smyrna, Turkey, or Levant Opium.*—This is usually in rounded, irregular, or flattened masses, weighing from $\frac{1}{2}$ to 2 pounds. The masses are wrapped in poppy leaves, and covered with the reddish-brown fruits of a species of Dock—little triangular fruits—which can be rubbed off with the fingers. When broken or cut, the surface is reddish-brown, granular, and, if fresh, plastic to the touch. The odour is very peculiar and persistent, the taste bitter.

(b) *Constantinople Opium.*—This is in masses varying in size, and wrapped in poppy leaves, the flattened mid-rib of which is usually placed across the middle of the cake, and constitutes a prominent and characteristic feature of this variety of opium. There are no dock

fruits on the surface, but the other characters are the same as those of Smyrna Opium.

Recognition.—The appearance of opium in mass is most characteristic, and the drug in this form can scarcely be confounded with anything else. The student should particularly notice the odour, which is characteristic, and with which it is highly important to be perfectly familiar. The powdered drug is considerably lighter in colour than the crude, and the odour becomes somewhat modified in the process of drying, but it is none the less quite characteristic.

Composition.—Opium is a very complex body, and contains as many as eighteen alkaloids, besides several neutral principles and organic acids, together with gum, resins and colouring matters. Only two of the alkaloids—‘Morphine,’ present in quantities from 5 to 12 per cent., and ‘Codeine,’ up to ‘6—are of much importance to the student.

Some of the other bodies are :

Alkaloids.—‘Narcotine’ or ‘Anarcotine,’ from 1 to 6 per cent.—most abundant in Indian opium, and having a medicinal action somewhat like quinine—‘Thebaine,’ ‘Papaverine,’ ‘Rhœadine,’ ‘Narceine,’ etc.

Neutral Bodies.—‘Meconin,’ ‘Meconiosin.’

Organic Acid. ‘Meconic Acid’ ($\text{H}_2\text{C}_7\text{HO}_7$), combined with morphine in opium as Meconate of Morphine, which is soluble in water. The free acid is but slightly soluble in water, freely in alcohol. It is in colourless, micaceous crystals, and gives a red colour with ferric chloride, a fact which is taken advantage of in testing for opium.

Prescribing.—Opium is used both externally and internally. Externally in the form of lotions, liniment, fomentations, and plaster. Internally in mixture, by means of the tincture or liquid extract, or in pills (powdered opium made into a pill with glycerine or other suitable excipient), enemas, and suppositories.

Dose.— $\frac{1}{2}$ to 2 grains.

Incompatibles.—Tannic Acid and astringent vegetable substances (remember that all alkaloids are precipitated by Tannic Acid), Arsenic, Copper, Iron, Lead and Silver salts, Alkalies and their Carbonates, Sal Volatile.

Solid Preparations of Opium. For external use (2)—

1. *Euplastrum Opii*—Plaster of Opium (Opium in powder, resin plaster—1 in 10).

2. *Unguentum Gallæ cum Opio*—Ointment of Galls and Opium (Opium in powder, ointment of galls—32 grains in 1 ounce).

For internal use (9)—1. *Extractum Opii*—Extract of Opium (Aqueous—2=1). Standardized to contain 20 per cent. of Morphine. *Dose*: $\frac{1}{4}$ to 1 grain.

2. *Pilula Ipecac. cum Scilla* (see Ipecac.)—1 in 20. *Dose*: 4 to 8 grains.

3. *Pilula Plumbi cum Opio* (see Plumbi Acetas)—1 in 8. *Dose*: 2 to 4 grains.

4. *Pilula Saponis Composita*—Pilula Opii, Compound Soap Pill (Opium, soap in powder, syrup of glucose—1 in 5). *Dose*: 2 to 4 grains.

5. *Pulvis Cretæ Aromaticus cum Opio* (see Creta Prep.)—1 in 40. *Dose*: 10 to 40 grains.

6. *Pulvis Ipecac. Compositus* (see Ipecac.)—1 in 10. *Dose*: 5 to 15 grains.

7. *Pulvis Kino Compositus* (see Kino)—1 in 20. *Dose*: 5 to 20 grains.

8. *Pulvis Opii Compositus*—Compound Powder of Opium (Opium, black pepper, ginger, caraway, tragacanth—1 in 10). *Dose*: 2 to 10 grains.

9. *Suppositoria Plumbi Composita* (see Plumbi Acetas)—1 grain in each.

Liquid Preparations of Opium.—For external use (1)—*Linimentum Opii*—Liniment of Opium (Tincture of opium, soap liniment—1 in 27).

For internal use (4)—1. *Extractum Opii Liquidum*—Liquid Extract of Opium. *Liquor Opii*, 'Liquor Opii Sedativus' (Extract. Opii macerated in water, spirit added, and filtered). Standardized to contain 75 per cent. Morphine; 1 grain Opium in 15 minims. *Dose*: 5 to 30 minims.

2. *Tinctura Camphoræ Composita*—'Paregoric' (see Camphor—2 grains in 1 ounce). *Dose*: $\frac{1}{2}$ to 1 drachm.

3. *Tinctura Opii*—Tincture of Opium. 'Laudanum' (Opium, rectified spirit and water). Standardized to contain 75 per cent. Morphine. *Dose*: 5 to 15 minims for repeated administration, 20 to 30 minims for a single dose.

4. *Tinctura Opii Ammoniata*—Ammoniated Tincture of Opium, 'Scotch Paregoric' (Tincture of Opium, benzoic acid, oil of aniseed, strong solution of ammonia.

rectified spirit — 5 grains in 1 ounce). *Dose*: $\frac{1}{2}$ to 1 drachm.

Note that, since the preparations of opium are made with a standard opium, they all contain a fixed proportion of morphine. The Liquid Extract and Tincture have the same strength and dose.

The free alkaloid morphine is not used in medicine. The official salts are the Hydrochloride, Acetate, and Tartrate. These are identical in medicinal action, and have the same dose. They merely differ in their solubility; the acetate is the most, and the hydrochloride the least, soluble in water.

Morphinæ Hydrochloridum—Hydrochloride of Morphine, Muriate of Morphia, 'Morphia,' Hydrochlorate of Morphine: $(C_{17}H_{19}NO_3HCl \cdot 3H_2O)$.

Production.—The hydrochloride of an alkaloid prepared from opium.

Characters.—Morphine Hydrochloride can be had in colourless crystals, but is nearly always seen as a white powder. Taste bitter. Soluble in spirit and in water (1 in 24).

Prescribing.—Rarely used externally. Internally in pills or in solution.

Dose.— $\frac{1}{4}$ to $\frac{1}{2}$ grain.

Incompatibles.—Ferrie Salts, Nitric Acid, Alkalies, and Astringent Bodies.

Preparations.—1. *Liquor Morphinæ Hydrochloridi*.—Solution of Hydrochloride of Morphine, 'Liquor Morphinæ' (Morphine hydrochloride, rectified spirit, water and dilute hydrochloric acid—1 in 100). *Dose*: 10 to 60 minims.

This is the solution always to be employed when Liquor Morphinæ is ordered. Note that all the solutions of morphine salts, except that for hypodermic use, have the same strength and dose.

2. *Suppositoria Morphinæ*.—Morphine Suppositories (Morphine hydrochloride, oil of theobroma— $\frac{1}{4}$ grain in each).

3. *Tinctura Chloroformi et Morphinæ*.—Compound Tincture of Chloroform and Morphine, 'Chlorodyne' (see Chloroform— $\frac{1}{15}$ grain in 10 minims).

4. *Trochiscus Morphinæ*.—Morphine Lozenge— $\frac{1}{16}$ grain in each, with Tolu basis.

5. *Trochiscus Morphinæ cum Ipecacuanha*.—Lozenge

of Morphine with Ipecacuanha (see Ipecac.)— $\frac{1}{3}$ grain in each, with Tolu basis.

Morphinæ Acetas—Acetate of Morphine, Acetate of Morphia; $C_{17}H_{19}NO_3 \cdot HC_2H_3O_2 \cdot 3H_2O$.

Production.—By neutralizing morphine with dilute acetic acid.

Characters.—A white crystalline powder, which on keeping often turns yellow, and gives off acetic acid. Soluble freely in spirit and in water (1 in $2\frac{1}{2}$).

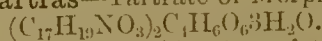
Prescribing.—Acetate of Morphine may be ordered as the hydrochloride.

Dose.— $\frac{1}{4}$ to $\frac{1}{2}$ grain.

Incompatibles.—As Morphine Hydrochloridum.

Liquor Morphinæ Acetatis—Solution of Acetate of Morphine (Morphine acetate, rectified spirit, water, dilute acetic acid—1 in 100). *Dose*: 10 to 60 minims.

Morphinæ Tartras—Tartrate of Morphine;



Production.—By the combination of tartaric acid and morphine.

Characters.—A white crystalline powder, soluble in water (1 in 11), insoluble in alcohol.

Prescribing.—As Hydrochloride of Morphine, but chiefly used in the form of the hypodermic injection.

Incompatibles.—As those of Morphine Hydrochloride.

Dose.— $\frac{1}{8}$ to $\frac{1}{2}$ grain.

Preparations—1. *Injectio Morphinæ Hypodermica*—Hypodermic Injection of Morphine (5 per cent. solution morphine tartrate in boiled and cooled distilled water—1 gr. in 22 mins.). *Dose*: 2 to 5 mins. subcutaneously.

2. *Liquor Morphinæ Tartratis*—Solution of Morphine Tartrate (Morphine tartrate, Rectified Spirit, water 1 in 100). *Dose*: 10 to 60 minims.

Codeina—Codeine; $C_{18}H_{21}NO_3 \cdot H_2O$.

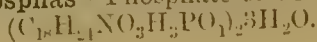
Production.—An alkaloid obtained from opium.

Characters.—In large colourless or slightly yellow crystals. Soluble in water (1 in 80), in spirit, and in diluted acids. Taste bitter.

Prescribing.—Codeine is usually prescribed in pills. Note the dose as compared with that of morphine.

Dose.— $\frac{1}{4}$ to 2 grains.

Codeinæ Phosphas—Phosphate of Codeine;



Characters.—White crystals, soluble in water (1 in 4).

Dose.— $\frac{1}{4}$ to 2 grains.

Preparation.—*Syrupus Codeinæ*—Syrup of Codeine—($\frac{1}{4}$ grain codeine phosphate in 1 drachm of a mixture of water and syrup). *Dose*: $\frac{1}{2}$ to 2 drachms.

Group IX. Coca and Cocaine.

*45. **Coca**—Coca, Coca Leaves.

Production.—The dried leaves of *Erythroxylum Coca*.

Characters.—Two varieties of Coca leaves are official, Bolivian and Peruvian. The Bolivian are more or less elongated oval leaves with an entire margin, of a brownish-green colour, from $1\frac{1}{2}$ to 3 inches long, and 1 to $1\frac{1}{2}$ inches wide. The upper surface is usually darker than the lower, and both show a network of veins. On the under surface a curved line can be seen on each side of the midrib; this line resembles the appearance that would be caused by running the edge of the thumb-nail up the leaf. The leaves have a faint peculiar odour. The Peruvian leaves are smaller, narrower, lighter in colour, and, being more fragile, are frequently seen in fragments; the curved line on the under surface is indistinct.

Recognition.—The general appearance, size, shape, and the characteristic curved line on the under surface, when present, distinguish Coca. Carefully compare the leaves with the others that have to be recognised, Senna, Jaborandi, Digitalis. The odour is not sufficiently characteristic.

Composition.—An important alkaloid, 'Cocaine,' or 'Erythroxyline' (less than 1 per cent.), and two or three other alkaloids allied to Cocaine, 'Cinnamyl-cocaine,' and 'Isatropyl-cocaine. Also a tannin giving a green colour or precipitate with ferric salts.

Prescribing.—Coca leaves have been used in Peru and Brazil for hundreds of years, chewed as a stimulant. The liquid extract may be ordered in mixtures. The student should note that this drug is in no way connected with Cocoa.

Dose of the leaf. 1 to 2 drachms.

Incompatibles.—Iron salts, Tannic matters, and Strong Mineral Acids.

Preparation.—*Extractum Cocæ Liquidum*—Liquid Extract of Coca (Coca leaves, alcohol 60 per cent.;

Maceration, percolation, and evaporation—1=1). *Dose*: $\frac{1}{2}$ to 1 drachm.

Cocaina—Cocaine, C'caine; $C_{17}H_{21}NO_4$. An alkaloid obtained from coca leaves.

Characters.—Colourless crystals. Insoluble in water, soluble in alcohol, ether, and chloroform, and in the fixed oils and fats.

Prescribing.—The free alkaloid is especially suitable for prescribing in ointments or suppositories, etc., since it is freely soluble in oils and fats.

Preparation. — *Unguentum Cocainæ* — Ointment of Cocaine (Cocaine, oleic acid, lard—4 per cent.).

Cocainæ Hydrochloridum—Hydrochloride of Cocaine. Hydrochlorate of Cocaine; $C_{17}H_{21}NO_4HCl$.

Production.—The hydrochloride of the alkaloid cocaine.

Characters.—Colourless crystals. Soluble in half its weight of water. Taste bitter, and produces tingling and numbness of the lips and tongue. Has no odour.

Prescribing. Not often used internally, when so in pill or solution. Largely used externally and by hypodermic injection in solutions of all strengths up to 20 per cent. For hypodermic injection the solutions should be made with recently boiled and cooled distilled water, and if they are intended to be kept, should contain a little boric or salicylic acid as a preservative.

Dose.— $\frac{1}{5}$ to $\frac{1}{2}$ grain.

Incompatibles. Alkalies and Permanganate of Potassium.

Preparations.—1. *Injectio Cocainæ Hypodermica* Hypodermic Injection of Cocaine (Cocaine hydrochloride, salicylic acid, recently boiled and cooled distilled water—10 per cent.). *Dose*: 2 to 5 minims subcutaneously.

2. *Lamellæ Cocainæ*—Disks of Cocaine. Each disk weighs $\frac{1}{10}$ grain, and contains $\frac{1}{10}$ grain Hydrochloride of Cocaine.

3. *Trochiscus Kramerie et Cocainæ* — Lozenge of Krameria and Cocaine. Each contains $\frac{1}{20}$ grain Hydrochloride of Cocaine, with the Fruit basis.

Group X.—Jaborandi and Pilocarpine.

*46. **Jaborandi**—Jaborandi, Pilocarpi Foliola, Jaborandi Leaves.

Production.—The dried leaflets of *Pilocarpus Jaborandi*.

Characters.—Jaborandi leaflets are about the size and shape of common laurel leaves. The colour varies from dark green to light brown, the under surface being a little lighter than the upper, and showing a prominent midrib. On holding the leaf up to the light, a number of translucent dots (oil glands) can be seen. No particular smell.

Recognition.—Note the general shape and colour of the leaf, the prominent midrib and translucent dots. On looking at the apex a minute notch will be noticed. This character, the so-called 'Emarginate apex,' at once distinguishes Jaborandi. Compare with Coca and Digitalis.

Composition.—An important alkaloid, said to be liquid 'Pilocarpine' or 'Jaborandine,' up to 1 per cent.; another alkaloid, 'Jaborine,' present in small quantity, and antagonistic to pilocarpine in its action; and a small quantity of volatile oil.

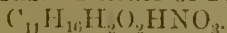
Prescribing.—Not used externally. Internally by means of the Liquid Extract and Tincture, in mixtures. The tincture is the best preparation.

Incompatibles.—Tannin bodies, Iron salts.

Preparations.—1. *Extractum Jaborandi Liquidum*—Liquid Extract of Jaborandi (Jaborandi, alcohol 45 per cent.; Maceration, percolation, evaporation). *Dose*: 5 to 15 minims.

2. *Tinctura Jaborandi*.—Tincture of Jaborandi (Jaborandi, alcohol 45 per cent. percolation.—1 in 5). *Dose*: $\frac{1}{2}$ to 1 drachm.

Pilocarpinæ Nitras.—Nitrate of Pilocarpine;



Production.—The nitrate of an alkaloid obtained from jaborandi leaves.

Characters.—A white crystalline powder, soluble in water (1 in 9), slightly soluble in alcohol.

Prescribing.—Best given in solution. It is often prescribed by hypodermic injection, and solutions should then be made with the same precautions used in making the official hypodermic injections. Sometimes used externally in solution for application to the eye.

Dose.— $\frac{1}{2}$ to $\frac{1}{2}$ grain by the mouth, $\frac{1}{10}$ to $\frac{1}{4}$ subcutaneously.

Incompatibles.—Alkalies, Tannic matters.

Group XI.—Quassia, Calumba, Gentian.

Quinine and Nux Vomica, when used in small doses, might be included in this group.

*47. **Quassia Lignum**—Quassia Wood, 'Bitter Wood.'

Production.—The wood (in chips, shavings, or raspings) of *Pieræna Excelsa*.

Characters.—Quassia Wood is imported in billets or logs, covered with a dark-gray bark; it is, however, usually seen in the form of chips. These are of a pale yellowish-white colour, tough and porous, and very bitter when chewed; they have no smell.

Recognition.—Quassia is easily recognised by its peculiar general appearance. All the other woods of the Pharmacopœia are highly coloured; moreover, it is the only substance in chips to be recognised.

Composition.—Quassia contains a neutral bitter principle, 'Quassin' (08 per cent.), soluble in cold water, and a little resin.

Prescribing.—Quassia may be given in mixture by means of the tincture and infusion; the latter is largely used as a vehicle for iron salts, as the wood (unlike most bitter substances) contains no tannin; it may therefore be mixed with iron salts without producing discoloration. Infusion of Quassia is sometimes used as an injection.

Preparations.—1. *Infusum Quassia*—Infusion of Quassia (Quassia, cold water—15 minutes; 1 in 100).
Dose: $\frac{1}{2}$ to 1 ounce.

Note that this preparation is made with cold water, cold water extracting all the properties as well as hot.

2. *Liquor Quassia Concentratus*—Concentrated Solution of Quassia (Quassia-wood, alcohol 20 per cent.; Maceration and percolation—1 in 10). *Dose*: $\frac{1}{2}$ to 1 drachm.

3. *Tinctura Quassia*—Tincture of Quassia (Quassia, alcohol 45 per cent.; Maceration—2 ounces in 1 pint).
Dose: $\frac{1}{2}$ to 1 drachm.

*48. **Calumbæ Radix**—Calumba Root, Columba Root.

Production.—The sliced root of *Jateorrhiza Columba*.

Characters.—Flat, more or less circular slices, from $\frac{1}{8}$ to $\frac{1}{2}$ inch thick, the centre of each slice slightly concave. Colour light brownish-yellow, the edge of each slice covered with a dark-brown skin. A dark line runs round

each piece near the edge. No particular smell; taste bitter. Brittle, the broken edges having a mealy appearance.

Recognition.—The appearance of Calumba Root is most characteristic. Note the concave depression on each side of the slice, and the dark line running near the edge; also the characteristic colouring. Some pieces are worm-eaten and exhibit small holes.

Composition.—Calumba contains a bitter principle, 'Calumbin'; a yellow substance, 'Berberine,' to which the colour of the drug is due; an organic acid, 'Calumbic Acid'; and about 33 per cent. of Starch. No 'Tannic Acid' is present.

Prescribing.—In the same manner as Quassia.

Preparations.—1. *Infusum Calumbæ*—Infusion of Calumba (Cold water, 1 ounce in 1 pint—30 minutes).

Dose: $\frac{1}{2}$ to 1 ounce.

Note that this preparation is made with *cold* water. This is in order to avoid dissolving out the starch, and thus forming a jelly-like mixture.

2. *Liquor Calumbæ Concentratus*—Concentrated Solution of Calumba (Calumba Root, cold water, rectified spirit; Maceration—1 in 2). *Dose:* $\frac{1}{2}$ to 1 drachm.

3. *Tinctura Calumbæ*—Tincture of Calumba (Alcohol 60 per cent.; Maceration—2 ounces in 1 pint). *Dose:* $\frac{1}{2}$ to 1 drachm.

*49. **Gentianæ Radix**—Gentian Root.

Production.—The dried root of *Gentiana Lutea*.

Characters.—Gentian Root is in long cylindrical pieces of a light brown colour; the outer surface is much wrinkled. Internally the root is spongy and of a light orange-brown colour. In the transverse section a dark red line runs near the outside bark. The odour is fragrant and peculiar.

Recognition.—The peculiar odour at once distinguishes Gentian. The student should also notice the colour, spongy nature, and the dark red line mentioned above.

Composition.—Gentian contains a bitter glucoside, 'Gentiopierin'; an organic acid, 'Gentisic Acid'; and about 15 per cent. of a peculiar sugar, 'Gentianose.' A substance which gives a black colour with iron salts is also present.

Prescribing.—Gentian may be given in the form of

extract in pills, and in mixtures by means of the infusion and tincture; these are very largely used. Gentian should not be ordered with salts of iron.

Incompatibles.—Iron Salts, Lead and Silver Salts.

Preparations.—1. *Extractum Gentianæ*—Extract of Gentian (an Aqueous Extract). *Dose*: 2 to 8 grains.

2. *Infusum Gentianæ Compositum*—Compound Infusion of Gentian (Gentian, dried orange-peel, fresh lemon-peel— $\frac{1}{4}$ ounce to 1 pint). *Dose*: $\frac{1}{2}$ to 1 ounce.

3. *Tinctura Gentianæ Composita*.—Compound Tincture of Gentian (Gentian, orange-peel, cardamom-seeds, alcohol 45 per cent.; Maceration—2 ounces in 1 pint). *Dose*: $\frac{1}{2}$ to 1 drachm.

Group XII.—Calabar Bean, Physostigmine.

*50. **Physostigmatis Semen**—Calabar Bean, Physostigmatis Faba, 'Ordeal Bean of Calabar.'

Production.—The dried seeds of *Physostigma Venenosum*.

Characters.—Beans rather larger than ordinary horse-beans, more or less kidney-shaped, with a dark, rough, chocolate-coloured skin. A broad black furrow runs entirely along the convex side. No smell. Inside the nucleus is white and brittle, and has little taste. The beans are poisonous.

Recognition.—The beans are easily recognised after seeing them once; there is no drug in the Pharmacopœia at all resembling them. Note the colour, size, and the broad black furrow.

Composition.—Calabar Bean contains an important alkaloid, 'Physostigmine,' or 'Eserine'; and another less important alkaloid, 'Calabarine.'

Prescribing.—Calabar Bean may be given in powder, as pills, but this is rarely done. The extract (in pills) is largely used.

Dose (of the powdered bean).—1 to 4 grains.

Preparation.—*Extractum Physostigmatis*—Extract of Calabar Bean. An Alcoholic Extract diluted with sugar of milk. *Dose*: $\frac{1}{4}$ to 1 grain.

Physostigminæ Sulphas—Sulphate of Physostigmine. Sulphate of Eserine; $(C_{15}H_{21}N_3O_2)_2H_2SO_4$.

Production.—The sulphate of the alkaloid Physostigmine from Calabar bean.

Characters.—Yellowish-white crystalline powder, turns red on exposure to light and air. Usually sold in sealed tubes, each containing 1 grain. Very soluble in alcohol and water.

Dose.— $\frac{1}{10}$ to $\frac{1}{2}$ grain.

Prescribing.—Physostigmine Sulphate, or, as it is more often called, Eserine Sulphate, is not often used internally. Externally in the B.P. Lamellæ, and in solutions for the eye. It is occasionally given subcutaneously.

Preparation.—*Lamellæ Physostigminæ*—Discs of Physostigmine Sulphate ($\frac{1}{100}$ grain in each).

Group XIII. — Caffein.

Caffeina—Caffein, Guaranine Theine; $C_8H_{10}N_4O_2 \cdot H_2O$.

Production.—An alkaloid obtainable from Tea, Coffee, Guarana, or Kola-nuts. Nearly all the Caffein used is prepared from Tea. Tea contains 3 to 5 per cent. of Caffein, Coffee to 1.5 per cent., Guarana up to 5 per cent., Kola 4 or 5 per cent.

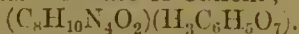
Characters.—White, silky masses of needles which at first sight have a cotton-wool-like appearance. Slightly soluble in water (1 in 80), more so in alcohol. It is perfectly soluble in water containing $\frac{1}{2}$ grain of Salicylate of Sodium in each ounce. No smell; taste bitter.

Prescribing.—Caffein may be prescribed in pills, powders, or in solution. It may also be given in wine or diluted spirit. A cup of tea is frequently the most satisfactory way of exhibiting Caffein.

Dose.—1 to 5 grains.

Incompatibles.—Tannic matters, Salts of Mercury, Iodide of Potassium.

Caffeinæ Citras—Citrate of Caffein;



Production.—By dissolving caffein in a solution of citric acid, and evaporating to dryness. Caffein Citrate is said not to be a true compound, but a mixture of citric acid and caffein.

Characters.—A white powder, with an acid and faintly bitter taste, soluble in water (1 in 82).

Prescribing.—This has no advantage over Caffein itself,

except that it is more soluble in water. It is prescribed in solution.

Dose.—2 to 10 grains.

Incompatibles.—Alkalies and Alkaline Carbonates, and these of Caffein.

Preparation.—*Caffeine Citras Effervescens*—Effervescent Citrate of Caffein (Citrate of Caffein, citric and tartaric acids, sugar, and bicarbonate of sodium; Granulate—4 per cent. of Citrate of Caffein). *Dose*: 1 to 2 drachms.

Group XIV.—Hemlock.

*51. **Conii Fructus**—Conium Fruit, Hemlock Fruit.

Production.—The unripe fruit of *Conium Maculatum*.

Characters.—Conium fruit are semi-lunar in shape, about $\frac{1}{8}$ inch long, and of a greenish-yellow colour; each fruit has five prominent light-coloured ridges. When the fruits are bruised and mixed with a little potash, or other alkali, a peculiar smell is developed, suggestive of mice. The dry fruits have no smell.

Recognition.—Note the general appearance and peculiar shape. Compare the fruits carefully with those of Caraway, and note that Caraway fruits are longer and darker in colour.

Composition.—Conium contains an important liquid volatile alkaloid, 'Conine'; two derivatives from Conine, 'Methylconine' and 'Conhydrine'; and 'Coniic Acid.'

Prescribing.—See *Conii Folia*.

Incompatibles.—Alkalies, astringent substances, vegetable acids.

Preparation.—*Tinctura Conii*—Tincture of Hemlock. (Conium, alcohol 70 per cent.; Percolation—1 in 5). *Dose*: $\frac{1}{3}$ to 1 drachm.

Conii Folia—Hemlock Leaves.

Production.—The fresh leaves of *Conium Maculatum*.

Characters.—Conium leaves, when fresh, are of dark green colour, much divided, and have a more or less powerful odour (especially when treated with potash), suggestive of mice. The stem on which they grow is marked with dark purple spots.

Composition.—As that of the fruit.

Prescribing.—Hemlock may be given internally in

mixtures by means of the juice or tincture of the seeds. An inhalation of Conine, made by mixing the juice with potash, is often used. Externally by the ointment, a preparation of very doubtful utility.

Incompatibles.—See Hemlock Fruit.

Preparations.—1. *Succus Conii*—Juice of Hemlock.
Dose : 1 to 2 drachms.

2. *Unguentum Conii*—Hemlock Ointment (Hemlock Juice, hydrous wool fat—2 ounces juice evaporated (below 140° F.) to 2 drachms, and mixed with $\frac{1}{2}$ ounce wool fat).

Group XV. — Asafœtida, Ammoniacum, Myrrh, Guaiacum.

*52. Asafœtida Asafœtida.

Production.—A gum resin obtained from *Ferula Fœtida*.

Characters.—In reddish-brown masses, consisting of small tears stuck together, or in distinct dull yellow tears. Opaque white when freshly broken, but changing gradually to pink or brown. Odour extremely persistent, penetrating, and onion-like.

Recognition.—Asafœtida is at once recognised by its characteristic odour.

Composition.—Asafœtida is a mixture of Essential Oil (5 per cent.), Resin (up to 65 per cent.), and Gum (30 per cent.). The Essential Oil contains Sulphur, and is allied to the Essential Oil of Garlic.

Prescribing.—Asafœtida being a gum resin, an emulsion can be made by rubbing the Asafœtida with water, and straining. It is often desirable that the patient should experience the nauseous taste of the drug; the tincture may then be given in mixture with a little Acacia or Tragacanth. When not desired to be tasted the drug may be given in pills.

Dose.—5 to 15 grains.

Preparations.—1. *Pilula Aloes et Asafœtidæ*—Pill of Aloes and Asafœtida (Socotrine Aloes, asafœtida, hard soap, confection of roses—1 in 4). *Dose* : 4 to 8 grains.

2. *Pilula Asafœtidæ Composita*—Compound Pill of Asafœtida, Pilula Galbani Composita (Asafœtida, galbanum, myrrh, syrup of glucose—1 in $3\frac{1}{2}$). *Dose* : 4 to 8 grains.

The official name of this preparation is *Pilula Galbani Composita*, and it may be prescribed under this name when it is desirable to conceal the fact that the patient is taking *asafœtida*.

3. *Tinctura Asafœtidæ*.—Tincture of *Asafœtida* (*Asafœtida*, alcohol 70 per cent.; Maceration—1 in 5). *Dose*: $\frac{1}{2}$ to 1 drachm.

Note that this preparation contains the resin and volatile oil only of the drug, and therefore needs an emulsifying agent to form a proper mixture with water. A little mucilage of tragacanth may be placed in the bottle and diluted with water, the tincture added, the mixture shaken, and the bottle filled up.

Spiritus Ammoniacæ Fœtidus.—See *Ammonia*, p. 34.

*53. **Ammoniacum**.—*Ammoniacum*.

Production.—A gum resin from *Dorema Ammoniacum*.

Characters.—*Ammoniacum* is in distinct separate tears or masses, varying in size from a pea to a walnut; these masses are white or of a light cinnamon-brown colour outside, brittle, and when broken the surface is white and shining. The odour is peculiar, and not at all onion-like.

Recognition.—*Ammoniacum* is recognised by its appearance, distinct and separate tears, colour, and fracture, and by its faint but very characteristic odour. The student is advised to make a careful comparison of all the drugs in Group XV., and especially to distinguish between *Asafœtida*, *Myrrh*, and *Ammoniacum*.

Composition.—Contains a volatile oil (4 per cent.), which contains no sulphur. Resin (65 to 72 per cent.), and Gum (varying in amount up to 24 per cent.).

Prescribing.—*Ammoniacum* may be given in mixture; rubbed down with water it forms an emulsion which is not very disagreeable to take. It can also be given in pills. For external use it is combined with mercury to form a plaister.

Dose.—5 to 15 grains.

Incompatibles.—Alkalies and Chlorinated bodies.

Preparations.—1. *Emplastrum Ammoniaci cum Hydrargyro*.—Plaster of *Ammoniacum* with Mercury (*Ammoniacum*, mercury, olive-oil, sulphur—4 in 5).

2. *Mistura Ammoniaci*.—*Ammoniacum* Mixture (*Ammoniacum*, water, syrup of tolu; rub and strain—1 in 32). *Dose*: $\frac{1}{2}$ to 1 ounce.

Ammoniacum is also contained in Compound Pill of Squill and Pill of Ipecacuanha and Squill.

***54. Myrrha—Myrrh.**

Production.—A gum resin from *Balsamodendron Myrrha*.

Characters.—In roundish tears or masses of tears, varying much in size. Colour a dusty red externally; on breaking one of the pieces the surface is oily, somewhat translucent, and of a rich brown colour. Odour peculiar, fragrant, and agreeable.

Recognition.—Myrrh is easily recognised by its red colour, general appearance, and especially characteristic agreeable odour.

Composition.—Myrrh consists of Volatile Oil (2 per cent.), Gum (from 45 to 75 per cent.), Resin (35 per cent.).

Prescribing.—Myrrh may be given in emulsion like Ammoniacum, or in pills, but is not much used alone internally. It is largely used in the form of the tincture, with water, in mouth-washes, gargles, etc., and in the powdered state in tooth-powders.

Dose.—10 to 30 grains.

Preparations.—1. *Pilula Aloes et Myrrhæ*—Pill of Aloes and Myrrh (1 in 4½). See Aloes.

2. *Tinctura Myrrhæ*—Tincture of Myrrh (Rectified Spirit; Maceration—1 in 5). *Dose*: ½ to 1 drachm.

This preparation contains the resin and volatile oil alone (for dispensing, see Tincture of Asafœtida). The residue left in making Tincture of Myrrh is gum, and can be dissolved in water to form mucilage.

Myrrh is also contained in Compound Decoction of Aloes, Compound Mixture of Iron, Compound Pill of Asafœtida, and Compound Pill of Rhubarb.

***55. Guaiaci Resina—Guaiacum Resin.**

Production.—The resin obtained from the wood of *Guaiacum Officinale* and *Sanctum* ('Lignum Vitæ').

Characters.—In round or oval tears or in masses. The masses are slightly powdery on the outside, and usually present a distinctly green appearance. The resin is brittle, the broken surface being glassy and of a brown colour. Thin pieces are translucent, brown in colour. No marked odour unless in powder. Powdered Guaiacum Resin when fresh is gray, but if it has been kept a little time has a green colour. The odour of the powder is characteristic.

Recognition.—The green colour of the masses, glassy fracture, and absence of marked odour, distinguish Guaiacum Resin. The student should compare it with aloes and myrrh, and notice the difference in colour and odour. In powder, the drug is easily recognised by its grayish-green colour and characteristic odour.

Composition.—Complex; contains several resin acids, 'Guaiaconic,' 'Guaiaretic,' and 'Guaiacic' Acids; a variety of resin, 'Guaiac Beta Resin'; and a colouring matter, 'Guaiac Yellow.'

Prescribing.—Guaiacum Resin may be given in mixture, the powdered resin rubbed down with a little mucilage or powdered acacia gum, and water added. The taste is nauseous, and some flavouring agent should be ordered: *Tinctura Guaiaci Ammoniata* is largely used; it needs suspending in water (see *Tinctura Asafoetide*). Guaiacum Resin is also given in powder with sulphur and other drugs.

Dose.—5 to 15 grains.

Incompatibles.—Acids, Spirit of Nitrous Ether.

Preparations.—1. *Mistura Guaiaci*—Guaiacum Mixture (Guaiacum resin, sugar, tragacanth, cinnamon-water—11 grains in 1 ounce). *Dose*: $\frac{1}{2}$ to 1 ounce.

2. *Tinctura Guaiaci Ammoniata*—Ammoniated Tincture of Guaiacum (Made with solution of ammonia, oils of lemon and nutmeg, and rectified spirit; Maceration—1 in 5). *Dose*: $\frac{1}{2}$ to 1 drachm.

3. *Trochiscus Guaiaci Resinae*—Guaiacum Resin Lozenge (3 grains in each with the Fruit basis).

Guaiacum Resin is contained in Compound Calomel Pill.

Group XVI.—Cinchona, Quinine, Salicin.

*56. *Cinchonæ Rubræ Cortex*—Red Cinchona Bark. Red Peruvian Bark.

Production.—The dried bark of *Cinchona Succirubra*.

Characters.—Red Cinchona Bark is in rolls, or more or less curved pieces; these vary in length from a few inches to a foot or more. The outer surface is rough and furrowed, and of a brownish-red colour; the inner surface a brick red. The bark has no particular smell. Indian 'renewed bark' in chips or shavings is often seen in museums; it is

of a lighter colour than that in rolls. All kinds of Cinchona bark have a characteristic short fibrous fracture.

Recognition.—The general appearance, colour, etc., distinguish Red Cinchona Bark; no other drug in the least resembles it. It is the only bark the student has to recognise.

Composition.—Cinchona Bark contains four alkaloids: 'Quinine,' 'Quinidine' (these are isomeric with each other, and differ but slightly in their physical properties), 'Cinchonine,' 'Cinchonidine' (also isomeric with each other).

Three organic acids: 'Kinic' or 'Quinic Acid,' closely allied to Benzoic Acid; 'Kinovic Acid'; and a variety of tannic acid, 'Cincho-Tannic Acid,' giving a green colour with ferric chloride. This acid is easily decomposed, forming a red insoluble substance, 'Cinchona Red,' and this is the body often deposited by preparations of Cinchona. Cinchona contains a very little volatile oil. It should be remembered that the action of all the alkaloids of Cinchona Bark is similar, but Quinine is by far the most powerful and valuable. The proportion of alkaloids varies with the variety of bark. Red Bark for medicinal purposes must not contain less than 5 to 6 per cent. of total alkaloids, of which at least half must be Quinine and Cinchonidine. A process for estimation is given in the British Pharmacopœia.

Prescribing.—Cinchona Bark may be given in powder, but the liquid preparations are more useful and convenient. The incompatibles should be remembered.

Dose (of the powdered bark).—3 to 15 grains, or $\frac{1}{2}$ to 2 drachms in aque.

Incompatibles.—Metallic Salts, Alkalies, especially Ammonia and Lime-water.

Preparations.—1. *Extractum Cinchonæ Liquidum*—Liquid Extract of Cinchona (a 'Standardized' preparation containing 5 per cent. of the mixed alkaloids of Cinchona).

Powdered Cinchona is exhausted with a mixture of glycerine, water, and hydrochloric acid by maceration and percolation. The liquid is evaporated, and the proportion of total alkaloids estimated in it. The extract is now further evaporated or diluted, so that 85 parts contain 5 of total alkaloids, and sufficient rectified spirit is added to make the volume 100. *Dose*: 5 to 15 minims.

2. *Infusum Cinchonæ Acidum*—Acid Infusion of Cinchona (Red Bark in powder, 1 ounce; aromatic sulphuric acid, 2 drachms; water, 1 pint one hour). *Dose*: $\frac{1}{2}$ to 1 ounce.

3. *Tinctura Cinchonæ*—Tincture of Cinchona (Alcohol 70 per cent.; Maceration and Percolation—1 in 5). Standardized to contain 1 per cent. total alkaloids. *Dose*: $\frac{1}{2}$ to 1 drachm.

4. *Tinctura Cinchonæ Composita*—Compound Tincture of Cinchona (Tincture of Cinchona, orange-peel, serpentary root, saffron, cochineal, alcohol 70 per cent.; Maceration. Standardized to contain .5 per cent. of total alkaloids). *Dose*: $\frac{1}{2}$ to 1 drachm.

*57. **Quininæ Sulphas**—Sulphate of Quinine, 'Quinine,' Sulphate of Quinia; $[(C_{20}H_{24}N_2O_2)_2(H_2SO_4)]_2 \cdot 15H_2O$.

Production.—The sulphate of an alkaloid from various species of Cinchona and Remijia.

Characters.—A mass of very small, silky-white needles; soft and velvety to the touch. No smell; taste intensely bitter. But little soluble in water (1 in 800), the aqueous solution having a very marked blue fluorescence. Freely soluble in all dilute acids; soluble in ammonia and alcohol.

Sulphate of Quinine is rarely quite pure, and may contain sulphates of Cinchonine, Cinchonidine, Quinidine, and occasionally Cupreine (an alkaloid present in Remijia Bark). According to the British Pharmacopœia, Sulphate of Quinine must not contain more than 3 per cent. of sulphate of Cinchonidine, and no Cinchonine, Quinidine, or Cupreine.

Recognition.—The general appearance and peculiar soft and velvety feel distinguish Quinine. Compare it with Benzoic Acid (which is usually aromatic), with Salicylic Acid (which is larger, and has a harsh feel), with Gallic Acid (which is larger, and of a yellow colour), and with Santonine (which is larger, and has a glittering appearance).

Prescribing.—Sulphate of Quinine may be given in pill; a very small quantity of strong sulphuric acid is the best excipient. In powder large doses are less tasted than when in solution. In mixtures dissolved in dilute acid (Sulphuric, Phosphoric, etc.); 1 minim of dilute acid may be used for each grain of Quinine Sulphate.

Externally Quinine, dissolved in water containing the

least possible quantity of dilute acid, is used as a lotion for the eyes and as an injection.

Dose.—1 to 5 grains as a bitter, 5 to 20 in fever, etc.

Incompatibles.—Astringent substances, Alkalies and their Carbonates, Iodine.

Preparations.—1. *Pilula Quininæ Sulphatis*—Quinine Pill (Quinine sulphate, glycerine, tartaric acid, tragacanth—5 in 6). *Dose*: 2 to 8 grains.

2. *Tinctura Quininæ Ammoniata*—Ammoniated Tincture of Quinine (Quinine sulphate, solution of ammonia, alcohol 60 per cent.—175 grains in 1 pint. *Dose*: $\frac{1}{2}$ to 1 drachm.

This preparation precipitates with water. When dispensing it, it should be mixed with a little diluted mucilage in a measure, and the mixture poured into the water.

Sulphate of Quinine is used in making Citrate of Iron and Quinine and Easton's Syrup.

Quininæ Hydrochloridum—Hydrochloride of Quinine, Hydrochlorate of Quinine; $C_{20}H_{24}N_2O_2 \cdot HCl \cdot 2H_2O$.

Production.—The hydrochloride of an alkaloid from Cinchona, etc.

Characters.—In crystals like Quinine Sulphate, but larger. Soluble in water (1 in 35), in spirit (1 in 3).

This salt is identical in action and dose with the sulphate, but is more soluble in water.

Prescribing.—In solution in water.

Dose.—1 to 5 grains as a bitter, 5 to 20 in fever, etc.

Preparations.—1. *Tinctura Quininæ*—Tincture of Quinine (Quinine hydrochloride, Tincture of Orange-peel—175 grains in 1 pint. *Dose*: $\frac{1}{2}$ to 1 drachm.

2. *Vinum Quininæ*—Quinine Wine (Quinine Hydrochloride—1 grain in 1 ounce of Orange Wine). *Dose*: $\frac{1}{2}$ to 1 ounce.

Quininæ Hydrochloridum Acidum—Acid Hydrochloride of Quinine; $C_{20}H_{24}N_2O_2 \cdot 2HCl \cdot 3H_2O$.

Characters.—A white crystalline acid powder soluble in less than its own weight of water.

Prescribing.—Owing to the great solubility of the salt, it is useful where large quantities of quinine are needed in solution.

Dose.—1 to 10 grains.

Salicinum—Salicin; $C_{13}H_{18}O_7$.

Production.—A glucoside prepared from willow bark, *Salix Alba*, and other species.

Characters.—A light, white crystalline powder. Taste very bitter. Soluble in water (1 in 28) and in spirit. Sulphuric acid colours it red.

Prescribing.—Salicin may be ordered in powders, to be dissolved in water, or in solution in mixtures.

Dose.—5 to 20 grains.

Group XVII.—Ipecacuanha, Senega, Apomorphine.

*58. Ipecacuanha—Ipecacuanha.

Production.—The dried root of *Psychotria Ipecacuanha*.

Characters.—In pieces about the thickness of a quill, from 2 to 4 inches long, and more or less twisted. The root has a ringed necklace-like appearance, and on looking at the transverse section may be seen to consist of a white central axis surrounded by a yellow-brown portion. The exterior of the root is of a grayish-brown colour. There is no marked smell to the entire root. The powdered drug has a faint peculiar odour.

Recognition.—The peculiar ringed necklace-like appearance is distinctive of Ipecacuanha; note also the colour and characteristic section. Compare the drug with Senega.

Composition.—An important alkaloid, 'Emetine' (from 1 to over 2 per cent.); a glucoside; an organic acid, Ipecacuanhic or Cephaëlic Acid; and a little volatile oil.

Prescribing.—In small doses in pill, larger doses in powder. The wine and vinegar and syrup are much used in mixtures. It is occasionally used externally in powder.

Dose (of the powdered drug).— $\frac{1}{2}$ to 2 grains as an expectorant, 15 to 30 grains as an emetic.

Incompatibles.—Alkalies, astringents.

Preparations.—1. *Extractum Ipecacuanhæ Liquidum*
Liquid Extract of Ipecacuanha. Ipecacuanha is exhausted by percolation with rectified spirit, and re-percolation, after mixture with slaked lime. The alcohol is distilled off, and the proportion of alkaloid determined in the residual liquid. The strength is then adjusted to form a standardized preparation containing 2 to 2.25 per cent.

of total alkaloids. *Dose* : $\frac{1}{2}$ to 2 minims (expectorant), 15 to 20 minims (emetic).

The liquid preparations are made from this standardized liquid extract, and are therefore also standardized.

2. *Acetum Ipecacuanhæ* — Vinegar of Ipecacuanha (Liquid Extract, 1; rectified spirit and dilute acetic acid, 9). Standardized, .1 per cent. of total alkaloid. *Dose* : 10 to 30 minims.

3. *Vinum Ipecacuanhæ* — Wine of Ipecacuanha (Liquid extract, 1; sherry, 19). Standardized contains .1 per cent. of total alkaloid. *Dose* : 10 to 30 minims (expectorant), 4 to 6 drachms (emetic).

The above two preparations are of the same strength.

4. *Pulvis Ipecacuanhæ Compositus* — Compound Powder of Ipecacuanha, 'Dover's Powder,' Pulvis Doveri (Ipecacuanha, opium, sulphate of potassium—1 each of Opium and Ipecacuanha in 10). *Dose* : 5 to 15 grains.

5. *Pilula Ipecacuanhæ cum Scilla* — Compound Pill of Ipecacuanha and Squill (Compound Powder of Ipecacuanha, squill, ammoniacum, syrup of glucose—1 each of Squill and Opium in 20). *Dose* : 4 to 8 grains.

6. *Trochiscus Ipecacuanhæ* — Lozenge of Ipecacuanha ($\frac{1}{4}$ grain in each with the Fruit basis).

7. *Trochiscus Morphine et Ipecacuanhæ* — Lozenge of Morphine and Ipecacuanha ($\frac{1}{12}$ grain Ipecacuanha and $\frac{1}{16}$ Morphine Hydrochloride in each with the Tolu basis).

Apomorphinæ Hydrochloridum — Hydrochloride of Apomorphine, Hydrochlorate of Apomorphine ;



Production. — By heating hydrochloride of morphine or codeine in sealed tubes with hydrochloric acid to a high temperature for some hours. The student should notice that Apomorphine is Morphine from which a molecule of H_2O has been removed. Its medicinal action is entirely different from that of Morphine.

Characters. — Small gray shining crystals, often of a green tint from exposure to air. No smell. Soluble in water (1 in 50) and in alcohol.

Prescribing. — Apomorphine is not often given by the mouth; when so, in solution. Solutions are decomposed on boiling. It is largely used hypodermically.

Dose. — $\frac{1}{16}$ to $\frac{1}{4}$ grain by the mouth, $\frac{1}{16}$ to $\frac{1}{10}$ grain hypodermically.

Incompatibles.—Alkalies, Iron Salts, Nitric Acid.

Preparation.—*Injectio Apomorphinæ Hypodermica*—Hypodermic Injection of Apomorphine (Apomorphine Hydrochloride, 1 grain; diluted hydrochloric acid, 1 minim; recently boiled and cooled distilled water. 110 minims—1 per cent. *Dose*: 5 to 10 minims subcutaneously.

This preparation keeps badly, and should be freshly made when wanted.

***59. Senegæ Radix**—Senega Root.

Production.—The dried root of *Polygala Senega*.

Characters.—Each piece consists of an irregular knotty lump, from which proceeds a tapering root, which is generally curved and twisted, and often branched. Externally the root is a light yellowish-brown. The odour is faint, but peculiar, somewhat suggestive of cherries.

Recognition.—Note the colour, odour, and peculiar knotty appearance of each piece. On examining a root carefully, a more or less perfect and prominent ridge or sinew of bark will be found running the length; this character (called 'the Keel') at once distinguishes Senega Root.

Composition.—Senega contains a glucoside, 'Senegin,' which is probably identical with 'Saponin,' found in Soap bark—this substance is the cause of the frothing of aqueous preparations of Senega when shaken—an organic acid, 'Polygalic Acid,' resin, and a little Volatile Oil.

Prescribing.—Senega is used in mixture only in the form of infusion and tincture. These preparations are emulsifying agents, and a few drops of the tincture (shaken with the oil and water) may be used to quickly prepare an emulsion.

Preparations.—1. *Infusum Senegæ*—Infusion of Senega (1 ounce to the pint—30 minutes). *Dose*: $\frac{1}{2}$ to 1 ounce.

2. *Liquor Senegæ Concentratus*—Concentrated Solution of Senega (Senega, alcohol 20 and 45 per cent.; Percolation—1 in 2). *Dose*: $\frac{1}{2}$ to 1 drachm.

3. *Tinctura Senegæ*—Tincture of Senega (Alcohol, 60 per cent.; Percolation—1 in 5). *Dose*: $\frac{1}{2}$ to 1 drachm.

Group XVIII.—Glycerine.

***60. Glycerinum**—Glycerine, Glycerol, Propenyl Alcohol; $C_3H_5(OH)_3$.

Production.—By the decomposition of certain oils and fats with alkalies ('Saponification,' see Fixed Oils), or by treating the oils and fats with superheated steam. It is purified by distillation under reduced pressure.

Characters.—A clear, colourless, oily fluid, without smell, and with a sweet taste. Freely miscible in all proportions with water and alcohol. It is a powerful solvent for many substances.

Recognition.—The clear, colourless, oily nature and absence of smell distinguish glycerine. The other colourless liquids the student has to recognise have all characteristic odours, and are not oily.

Prescribing.—Externally, glycerine is largely used alone, or, mixed with water, as an emollient. It is hygroscopic, and renders the skin dry. It is rapidly absorbed by the skin, and is therefore a useful medium for dissolving substances which are to be absorbed. Owing to its sticky, tenacious character, it is a valuable solvent for drugs which are intended to exert a prolonged local action, as in paints for the throat, etc.

Internally, Glycerine is much used as an injection, and in the form of suppositories. By the mouth, it has been used as a substitute for Cod-liver-oil, and, owing to its sweet taste, it may be used for flavouring mixtures.

Incompatibles.—Permanganate of Potassium.

Dose.—1 to 2 drachms.

Preparations.—1. *Glycerinæ* — Glycerines. These are solutions of drugs in glycerine intended for local application. The *Glycerinæ* mentioned in this volume are those of Boric Acid, Carbolic Acid, Tannic Acid, Alum, Borax, and Subacetate of Lead (see under each drug). Glycerine of Tragacanth is a useful excipient for most pills.

2. *Suppositoria Glycerini*—Suppositories of Glycerine (Gelatine, glycerine, water — 70 per cent. Glycerine). These may be made of any size required; each will contain 70 per cent. by weight of Glycerine.

Group XIX.—Nux Vomica, Strychnine.

*61. **Nux Vomica**.—Nux Vomica, 'Quakers' Buttons.'
Production.—The seeds of *Strychnos Nux Vomica*.

Characters.—Flat, circular beans, about an inch in diameter. Grayish-green in colour, and covered with short satiny hairs. Internally they are very tough and horny, translucent when cut. No odour, and taste very bitter. The seeds are highly poisonous.

Recognition.—The flat, circular shape, colour, and satiny appearance at once distinguishes Nux Vomica. No other drug at all resembles it.

Composition.—Nux Vomica contains two important alkaloids, 'Strychnine' and 'Brucine'; an organic acid, 'Igasuric' or 'Strychnic Acid,' which gives a green colour with ferric salts; and a glucoside, 'Loganin.' The two alkaloids have the same medicinal action, but Strychnine is very much the more powerful and rapid of the two.

Prescribing.—Nux Vomica is largely given in pills by means of the extract, and in mixture by means of the tincture.

Incompatibles.—Iron Salts. Astringents.

Dose (of the powdered bean).—1 to 4 grains.

Preparations.—1. *Extractum Nucis Vomice Liquidum*.—Liquid Extract of Nux Vomica. Nux Vomica is exhausted with 70 per cent. alcohol by maceration and percolation; the alcohol is distilled off, and the proportion of Strychnine in the residual liquid estimated. This is then diluted with the alcohol to make a standardized preparation containing 1.5 per cent. of Strychnine. *Dose*: 1 to 3 minims.

The other preparations are made from this standardized liquid extract.

2. *Extractum Nucis Vomice*.—Extract of Nux Vomica. The liquid extract is evaporated, and the residue diluted with sugar of milk, so that it contains 5 per cent. of Strychnine. *Dose*: $\frac{1}{4}$ to 1 grain.

3. *Tinctura Nucis Vomice*.—Tincture of Nux Vomica (Liquid Extract of Nux Vomica, 1, mixed with water and rectified spirit to make 6; contains .25 per cent. of Strychnine— $\frac{1}{4}$ grain in 110 minims. *Dose*: 5 to 15 minims.

***62. Strychnina**—Strychnine, Strychnia ; $C_{21}H_{22}N_2O_2$.

Production.—An alkaloid obtained from *Strychnos Nux Vomica* and other species of *Strychnos*.

Characters.—In small, white, shining, elongated crystals. Very little soluble in water, but the aqueous solution is intensely bitter, slightly soluble in alcohol. Soluble in strong sulphuric acid, forming a colourless solution, which, if touched with a crystal of bichromate of potash, becomes violet, then red and yellow. Extremely poisonous.

Recognition.—Strychnine can only be recognised by its general appearance. The student must make himself familiar with its appearance, and should carefully compare it with that of salicylic acid in large crystals. The chemical test given above is most distinctive.

Prescribing.—Strychnine may be given in pills, using the same precautions in preparing them as described under Mercuric Chloride. It is best given in solution by means of the liquor.

Dose.— $\frac{1}{60}$ to $\frac{1}{15}$ grain.

Contained in 'Easton's Syrup,' $\frac{1}{32}$ grain in 1 drachm.

Strychninæ Hydrochloridum—Hydrochloride of Strychnine ; $C_{21}H_{22}N_2O_2HCl2H_2O$.

Characters.—In small colourless crystals ; soluble in water (1 in 35) and in alcohol (1 in 60).

Prescribing.—This salt is much more soluble in water than Strychnine, and is therefore to be preferred when strychnine is required in solution.

Preparation.—*Liquor Strychninæ Hydrochloridi*—Solution of Strychnine Hydrochloride—*Liquor Strychninæ* (Strychnine Hydrochloride, S.V.R., Water—1 per cent.).

Dose : 2 to 8 minims.

Group XX.—Belladonna, Henbane, Stramonium, and Indian Hemp.

***63. Belladonnæ Radix**—Belladonna Root, 'Deadly Nightshade' Root.

Production.—The dried root of *Atropa Belladonna*.

Characters.—In pieces up to a foot long, and $\frac{1}{2}$ inch in diameter. Externally the root is covered with a rough and wrinkled light-brown skin ; this can be easily

seraped off. Internally it is white and fibrous in appearance. The root has no smell. Belladonna root is often in pieces, which have been split in two lengthwise; the central portion of the root then remains attached to one half as a prominent ridge, whilst the other half has a corresponding furrow.

Recognition.—The colour, light brown outside and white inside, fibrous nature, and absence of smell, distinguish belladonna. No other root resembles it closely. Compare it with Gentian.

Composition.—Two important alkaloids, 'Atropine,' up to '3 per cent., and 'Hyoscyamine,' in combination with Malic Acid. These two alkaloids, together with 'Daturine,' found in Stramonium, and other alkaloids found in plants allied to belladonna, are either chemically identical or isomeric, and, as they all dilate the pupil of the eye, are often spoken of as the 'Mydriatic Alkaloids.' The medicinal action of Belladonna, Hyoscyamus and Stramonium is consequently very similar, Hyoscyamus being much the weaker of the three.

Prescribing.—See *Belladonna Folia*.

Incompatibles.—Strong alkalies; astringents.

Preparations.—1 *Extractum Belladonnæ Liquidum*—Liquid Extract of Belladonna. Belladonna root is exhausted by repeated maceration and repercolation with diluted alcohol, the proportion of alkaloids in the liquid produced estimated, and sufficient diluted alcohol added to make a standardized preparation containing '75 per cent. of the alkaloids of belladonna. From this liquid extract all the preparations of belladonna root are made, and they are therefore all standardized. In the following list they are arranged according to their strength.

2. *Extractum Belladonnæ Alcoholicum*—Alcoholic Extract of Belladonna. (The liquid extract is evaporated and mixed with sugar of milk.) Contains 1 per cent. of alkaloids. *Dose*: $\frac{1}{4}$ to 1 grain.

The student should carefully distinguish this brown extract of the root from the green extract of the leaves.

3. *Unguentum Belladonnæ*—Ointment of Belladonna (Liquid Extract evaporated, benzoated lard). Contains '6 per cent. of alkaloids.

4. *Emplastrum Belladonnæ*—Plaster of Belladonna

(Liquid Extract evaporated, resin plaster). Contains .5 per cent. of alkaloids.

This plaster is brown, but a green unofficial plaster made from the green extract is very largely used.

5. *Linimentum Belladonnæ*—Liniment of Belladonna (Liquid Extract, camphor, water, rectified spirit—1 in 2 liquid extract). Contains .375 per cent. of alkaloids.

6. *Tinctura Belladonnæ*—Tincture of Belladonna (Liquid Extract, alcohol 60 per cent.—1 in 15 liquid extract). Contains .05 per cent. of alkaloids. *Dose*: 5 to 15 minims.

7. *Suppositoria Belladonnæ*—Belladonna Suppositories (Alcoholic Extract, oil of theobroma— $1\frac{1}{2}$ grains extract in each). Each contains $\frac{1}{10}$ grain of alkaloids.

Belladonnæ Folia—Belladonna Leaves, 'Deadly Nightshade' Leaves, 'Dwale.'

Production.—The fresh leaves and branches of *Atropa Belladonna*.

Characters.—The leaves vary in size from 3 to 8 inches in length. They are of an elongated oval in shape, tapering at the apex to a point. Surface smooth, colour greenish-yellow, when dry the upper side darker than the under. The edge of the leaf is entire. There is no characteristic odour.

Composition.—As that of the root, but less rich in alkaloids.

Prescribing.—Externally belladonna may be ordered in the form of liniment, painted or rubbed on the skin, or applied on lint. Plasters, both brown and green, are much used, but are often replaced by a Glycerine of Belladonna, made by mixing the green extract with glycerine and water. Internally belladonna is given in pills of the extracts, or by means of the tincture and succus in mixtures. Suppositories of Belladonna are also used. Note that preparations of the root are much more powerful than those of the leaves.

Incompatibles.—See Root.

Preparations (of the leaves).—1. *Extractum Belladonnæ Viride*—Extract of Belladonna (A green extract). *Dose*: $\frac{1}{4}$ to 1 grain.

2. *Succus Belladonnæ*—Juice of Belladonna (see Succs). *Dose*: 5 to 15 minims.

Atropina—Atropine, Atropia; $C_{17}H_{23}NO_3$.

Production.—An alkaloid obtained from belladonna root or leaves.

Characters.—Colourless crystals. But little soluble in water (1 in 300), freely so in alcohol, and in dilute acids. Decomposed by alkalis. Very poisonous.

Prescribing.—Very rarely used internally. Externally in ointment. The sulphate is alone to be used in solution for the eye, or by hypodermic injection.

Dose.— $\frac{1}{300}$ to $\frac{1}{100}$ grain.

Preparation.—*Unguentum Atropinæ*—Ointment of Atropine (Atropine, oleic acid, lard—2 per cent.).

Atropinæ Sulphas—Sulphate of Atropine, Sulphate of Atropia; $(C_{17}H_{23}NO_3)_2H_2SO_4$.

Production.—By neutralizing atropine with dilute sulphuric acid.

Characters.—Nearly colourless crystals or a white powder. Soluble in water (1 in 1). Very poisonous.

Prescribing.—Atropine sulphate is largely used externally in solution as an application to the eye, or in the B.P. Lamellæ, or as 'Atropine Gelatine.' As a lotion, a very weak solution in Eau de Cologne forms an elegant application. Internally it is given by the mouth (in solution) or by hypodermic injection.

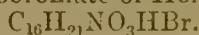
Dose.— $\frac{1}{300}$ to $\frac{1}{100}$ grain.

Incompatibles.—Alkalis, Tannic matter.

Preparations.—1. *Liquor Atropinæ Sulphatis*—Solution of Sulphate of Atropine (Sulphate of Atropine, salicylic acid, recently boiled and cooled distilled water—1 in 100). *Dose*: $\frac{1}{2}$ to 1 minim.

2. *Lamellæ Atropinæ*—Disks of Atropine. Each contains $\frac{1}{300}$ grain of Sulphate of Atropine.

Homatropinæ Hydrobromidum—Hydrobromide of Homatropine, Hydrobromate of Homatropine;



Production.—By the action of certain reagents, atropine or hyoscyamine can be decomposed into two bodies, 'Tropic Acid' and 'Tropine.' By combining the latter with Mandelic Acid, a salt, 'Mandelate of Tropine,' is formed, which on treatment with dilute acid forms an artificial alkaloid, 'Homatropine.' This is combined with hydrobromic acid to form Homatropine Hydrobromide.

Characters.—A white crystalline powder. Soluble in water (1 in 6), less so in alcohol.

Prescribing.—Homatropine is used as a substitute for atropine sulphate for application to the eye; it acts quicker, and its effects are less persistent than those of atropine. It is said to be much less poisonous. Internally in solution.

Dose.— $\frac{1}{80}$ to $\frac{1}{20}$ grain.

Incompatibles.—Alkalies, Tannic matter.

Preparation.—*Lamellæ Homatropinæ*—Discs of Homatropine ($\frac{1}{60}$ grain in each).

Hyoscyami Folia—Hyoscyamus Leaves, 'Henbane' Leaves.

Production.—The fresh leaves, flowers, and branches, and the dried leaves of *Hyoscyamus Niger*.

Characters.—The leaves vary in length up to 10 inches; shape a triangular ovate, the edge being toothed. Colour pale green, the under surface of the leaf having a hairy appearance. Odour peculiar. The leaves have a damp and clammy feel, which is very characteristic. The flowers are yellow, veined with blue.

Composition.—'Hyoscyamine,' an alkaloid isomeric with, and easily convertible into, Atropine, and 'Hyosceine,' an alkaloid isomeric with Hyoscyamine. These are in combination with Malic Acid.

Prescribing.—Hyoscyamus is largely ordered as the extract in pills as a corrective to the action of purgative drugs. Note the doses of the preparations, which are larger than those of belladonna or stramonium. The tincture and succus are given in mixtures. Alkalies, although said to be incompatible, are largely prescribed with preparations of hyoscyamus. Not used externally.

Incompatibles.—Lead and Silver Salts, Caustic Alkalies (?), Vegetable Acids.

Preparations.—1. *Extractum Hyoscyami Viride*—Green Extract of Hyoscyamus (a green extract). **Dose** : 2 to 8 grains.

2. *Pilula Colocynthis et Hyoscyami*—1 in 4 (see Colocynth).

3. *Succus Hyoscyami*—Juice of Hyoscyamus (see Succ). **Dose** : $\frac{1}{2}$ to 1 drachm.

4. *Tinctura Hyoscyami*—Tincture of Hyoscyamus

(Dried Leaves, alcohol 45 per cent.; Percolation—1 in 10). *Dose*: $\frac{1}{2}$ to 1 draehm.

Hyoscinæ Hydrobromidum—Hyoseine Hydrobromide, Scopolamine Hydrobromide; $C_{17}H_{21}NO_4HBr \cdot 3H_2O$.

Production.—The hydrobromide of an alkaloid found in hyoseyamus leaves, etc.

Characters.—Colourless transparent crystals. Soluble in water (1 in 1) and in alcohol.

Prescribing.—See Hyoscyamine Sulphate.

Incompatibles.—As those of Atropine Sulphate.

Dose.— $\frac{1}{200}$ to $\frac{1}{100}$ grain.

Hyoscyaminæ Sulphas—Hyoseyamine Sulphate;
 $(C_{17}H_{23}NO_3)_2H_2SO_4 \cdot 2H_2O$.

Production.—The sulphate of an alkaloid found in hyoseyamus leaves, etc.

Characters.—A crystalline deliquescent powder. Soluble in water (2 in 1) and in alcohol.

Prescribing.—This drug and Hydrobromide of Hyosceine can be used in the same way as Atropine Sulphate. They are, however, more often given by hypodermic administration. A solution containing 1 grain in 500 minims of sterilized water is convenient for this purpose, the dose subcutaneously of the solution being 2 to 10 minims.

***64. Stramonii Semina**—Stramonium Seeds, 'Thorn-apple' seeds.

Production.—The dried ripe seeds of *Datura Stramonium*.

Characters.—Brownish-black kidney-shaped seeds about $\frac{1}{8}$ inch long. The surface is wrinkled and pitted. They have no odour.

Recognition.—Stramonium seeds are easily recognised by their characteristic kidney shape, black colour, and pitted appearance. No other seeds resemble them.

Composition.—'Daturine,' an alkaloid, is the chief constituent. This exists as Malate, and is, as already stated, closely allied to Hyoscyamine and Atropine. The seeds also contain about 25 per cent. of a fixed oil, and a body which in alcoholic solution exhibits a bright green fluorescence.

Prescribing.—Usually in pills by means of the extract.

Incompatibles.—Mineral Acids, Metallic Salts, Caustic Alkalies.

Preparations.—*Extractum Stramonii*—Extract of

Stramonium made with Alcohol 70 per cent. *Dose* : $\frac{1}{4}$ to 1 grain.

Stramonii Folia—Stramonium Leaves, ‘Thorn-apple’ leaves.

Production.—The dried leaves of *Datura Stramonium*.

Characters.—About 6 inches long ; shape oval, but the edges are deeply toothed, and the apex pointed. Surfaces smooth. Colour darkish green, the upper darker than the under surface. Odour heavy and peculiar.

Composition.—As that of the seeds. The seeds are much the stronger.

Prescribing.—The dried leaves are made into cigarettes or a tobacco and smoked to relieve asthma ; or the powdered leaves (mixed with Nitrate of Potassium, etc.) may be burnt, and the smoke inhaled. By the mouth, as the tincture in mixtures.

Preparation.—*Tinctura Stramonii*—Tincture of Stramonium (Stramonium Leaves, alcohol 45 per cent. ; Percolation—1 in 5). *Dose* : 5 to 15 minims.

*65. **Cannabis Indica**—Indian Hemp, Cannabis Indica, ‘Hashish,’ Gunjah.

Production.—The dried tops, in fruit or flower, of the female plants of *Cannabis Sativa*.

Characters.—Cannabis Indica is generally seen in the form of hollow stems several inches long, and up to the diameter of a slate pencil in thickness ; from these stems short stalks proceed alternately, each bearing a mass of small dark-green leaves, fruit, and flowers, closely stuck together by a resinous matter which exudes from the plant. Some samples of the drug consist of these masses only, without the main stalk. The drug is rough and brittle to the touch. The odour is peculiar and characteristic.

Recognition.—The general appearance of the drug is most characteristic, and easily identifies Indian hemp. The smell, which is very noticeable in the extract, is quite peculiar, and unlike that of any other drug.

Composition.—A resin known as ‘Cannabinon,’ amorphous ; a volatile oil, ‘Cannabene’ ; and a volatile alkaloid, ‘Cannabinine,’ are said to be the chief active principles. There is still considerable doubt as to what body this drug owes its activity to.

Prescribing.—Not often used externally. Internally, in pills by the extract, and in mixture by the tincture.

The latter preparation precipitates with water, and must be dispensed with tragacanth or acacia mucilage (see Tinct. Asafœtida).

Preparations.—1. *Extractum Cannabis Indicæ*—Extract of Indian Hemp (An alcoholic extract). *Dose* : $\frac{1}{4}$ to 1 grain.

2. *Tinctura Cannabis Indicæ*—Tincture of Indian Hemp (Extract, rectified spirit—1 in 20; dissolve). *Dose* : 5 to 15 minims.

Tincture of Indian Hemp is contained in Tincture of Chloroform and Morphine (1 in 10).

Group XXI.—*Digitalis*, *Strophanthus*, and *Squill*.

*66. *Digitalis Folia*—*Digitalis* leaves, 'Foxglove' leaves.

Production.—The dried leaves of *Digitalis Purpurea*.

Characters.—Shape a more or less elongated, tapering oval. The margin of the leaf extends some way down each side of the stalk. The edge of the leaf is finely toothed, the upper surface slightly hairy and of a dull-green colour, lower surface paler and downy. The veins on the lower surface are very conspicuous, and form a prominent white network. Odour faint, but peculiar.

Recognition.—The finely-toothed margin, and especially the conspicuous white network on the lower surface of the leaf, distinguish *Digitalis*. This latter characteristic is peculiar to the drug, and will distinguish it from other leaves, even in fragments. Compare the leaves with the others to be recognised—Coca, Jaborandi, and Senna.

Composition.—Four glucosides, 'Digitalin,' 'Digitalein,' 'Digitoxin' (these three have a similar pharmacological action); the fourth glucoside, 'Digitonin,' is closely allied to, if not identical with, 'Saponin.' An organic acid, 'Digitalic acid,' and a tannin giving a green colour with ferric salts, are also present.

Prescribing.—*Digitalis* leaf may be given (in powder) in pills, but the infusion and tincture, the latter especially, are chiefly used.

Dose (of the powdered leaf).— $\frac{1}{2}$ to 2 grains.

Incompatibles.—Ferrie Salts (but these are very largely prescribed with it). Lead Salts, Preparations of Cinchona.

Preparations.—1. *Infusum Digitalis*—Infusion of Foxglove (Dried leaf, boiling water, 15 minutes—1 drachm in 1 pint). *Dose*: 2 to 4 drachms.

Carefully notice the dose of this preparation; the dose of most infusions is 1 ounce. Infusion of *Digitalis* chiefly contains 'Digitonin.'

2. *Tinctura Digitalis*—Tincture of Foxglove (Dried leaf, alcohol 60 per cent.; Percolation—1 in 8). *Dose*: 5 to 15 minims.

*67. **Strophanthi Semina**—*Strophanthus* Seeds.

Production.—The dried ripe seeds of *Strophanthus Kombé* freed from their awns.

Characters.—Long, narrow, oval seeds, about $\frac{3}{8}$ inch long and $\frac{1}{8}$ inch broad, tapering at one end to a sharp point. The colour is a greenish-fawn, and they are covered with closely-pressed silky hairs. On one side of each seed, running from the centre to the apex, is a longitudinal ridge.

Recognition.—The general appearance of the seeds is very characteristic, and they are quite unlike the other official seeds. Compare them with *Conium* and *Stramonium*.

Composition.—They contain a glucoside, 'Strophanthin' (up to 10 per cent.): this is closely allied to, or identical with, a body 'Oubaine,' also isolated from the seeds—it is soluble in water; an organic acid, 'Kombic Acid,' and a crystalline body, 'Incin,' of which little is known. The seeds also contain much fixed oil.

Prescribing.—As pills by means of the extract, or in mixture by the tincture.

Preparations.—1. *Extractum Strophanthi*—Extract of *Strophanthus*. The dried powdered seeds are percolated with ether to remove fixed oil (which is useless, and would prevent the extract from keeping); the residue is percolated with S.V.R., the spirit evaporated off, and the residual extract diluted with sugar of milk. *Dose*: $\frac{1}{2}$ to 1 grain.

2. *Tinctura Strophanthi*—Tincture of *Strophanthus* (Dried Seeds, alcohol 70 per cent.; Percolation—1 in 40. *Dose*: 5 to 15 minims.

*68. **Scilla**—Squill.

Production.—The sliced and dried bulb of *Urginea Scilla*.

Characters.—The Squill bulb is a large pear-shaped bulb, weighing from $\frac{1}{2}$ to 4 pounds, but in pharmacy the sliced bulb is always used. This is in flat slices more or less curved, about 1 inch long, and up to $\frac{1}{4}$ inch broad, and of a light-yellow colour. The pieces are tough and leathery, or, if very dry, brittle. They have no particular odour.

Recognition.—The peculiar tough, leathery nature and translucent appearance distinguish squill. Compare the slices with Quassia chips, to which they have a superficial resemblance. Occasionally squill has a pinkish tinge.

Composition.—Squill contains 'Scillitoxin,' the chief active body; 'Scillipicrin,' closely allied to Scillitoxin. 'Seillin,' a bitter glucoside, and a considerable amount of mucilage.

Prescribing.—In powder it is largely used in pills; in mixtures, the tincture, syrup, and oxymel are very largely used. Squill is closely allied to Digitalis in its action, and hence its use requires caution.

Dose (in powder).—1 to 3 grains.

Preparations.—1. *Acetum Scillæ*—Vinegar of Squill (Squill, dilute acetic acid: Maceration—1 in 8). *Dose*: 10 to 30 minims.

2. *Oxymel Scillæ*—Oxymel of Squills (Squill is digested in a mixture of acetic acid and water for seven days, the marc pressed, and the liquid filtered and mixed with liquid clarified honey). *Dose*: $\frac{1}{2}$ to 1 drachm.

3. *Syrupus Scillæ*—Syrup of Squills (Vinegar of Squill, 1 pint; sugar, 38 ounces; dissolve). *Dose*: $\frac{1}{2}$ to 1 drachm.

Notice that these three preparations contain free acetic acid, and should not be, therefore, prescribed with carbonates or with Sal Volatile.

4. *Pilula Scillæ Composita*—Compound Squill Pill (Squill in powder, ginger, ammoniacum, hard soap, syrup of glucose—1 in 5). *Dose*: 4 to 8 grains.

5. *Pilula Ipecacuanhæ cum Scilla* (1 in 6). See Ipecacuanha, p. 109.

6. *Tinctura Scillæ*—Tincture of Squill (Squill, alcohol 60 per cent.; Maceration—1 in 5). *Dose*: 5 to 15 minims.

Group XXII.—Castor-oil and other Purgatives.***69. Oleum Ricini—Castor-oil.**

Production.—A fixed oil expressed from the seeds of *Ricinus Communis*.

Characters.—A thick viscid oil, colourless or slightly yellow. Odour faint, but most persistent and disagreeable. Taste unpleasant and acrid. Soluble in rectified spirit (1 in 2). Forms a jelly when rubbed with glycerine.

Recognition.—The peculiar faint but persistent odour is the most characteristic property, and, in conjunction with the thick viscid consistence, at once identifies the oil.

Composition.—Chiefly consists of 'Ricimoleate of Glyceryl' and the glycerides of other fatty acids; no purgative principle has yet been found in it.

Prescribing.—Owing to its viscid, sticky nature, castor-oil is sometimes used as an external application, *e.g.*, in burns and injury to the eye with Quicklime. Internally castor-oil may be given in various ways. Its taste is disgusting, and should be disguised as much as possible. The oil may be floated on the surface of an ounce of peppermint or plain water, and the mixture quickly swallowed, or it may be made into an emulsion with yolk of egg or acacia, and flavoured with peppermint or other agent, or it may be given in small doses in capsules. The jelly it forms with glycerine is sometimes useful, as is also the solution in extract of malt. Castor-oil is sometimes given as an enema.

Dose.—1 to 8 drachms.

Preparation.—*Mistura Olei Ricini*—Castor-oil Mixture (Castor-oil, orange-flower-water, mucilage of acacia and cinnamon-water—3 drachms in 1 ounce). *Dose*: 1 to 2 ounces.

Castor-oil is also contained in Collodium Flexile and Pil. Hydrarg. Subchlor. Comp.

Oleum Crotonis—Croton-oil.

Production.—A fixed oil expressed from the seeds of *Croton Tiglium*.

Characters.—A brownish-yellow, more or less viscid fixed oil. Fluorescent. Odour faint, but disagreeable and rancid, taste burning and acrid. The oil is highly poisonous. Soluble in alcohol.

Composition.—Besides the ordinary glycerides of fatty

acids present in most fixed oils, Croton-oil contains at least two highly active bodies, one of which is a blistering agent, 'Crotonol,' the other a purgative, 'Crotonic Acid.' Little is known of their chemical nature.

Prescribing.—Externally, a few drops may be gently rubbed into the skin with the tip of the finger, or by other means. It acts violently, producing pustules, and requires care; Linimentum Crotonis is a safer and less violent counter-irritant. Internally, Croton-oil may be given in pills made with a little soap and powdered liquorice, or a dose may be placed upon a lump of sugar and the sugar quickly swallowed, or the oil mixed with butter and placed upon the tongue. It acts very quickly, and requires caution in its administration.

Dose.— $\frac{1}{2}$ to 1 minim. (Carefully note the dose.)

Preparation.—*Linimentum Crotonis*—Liniment of Croton-oil (Croton-oil, oil of cajeput, rectified spirit—1 in 8).

*70. **Aloe Barbadosis**—Barbadoes Aloes, Curaçao Aloes.

Production.—The inspissated (dried) juice from the leaves of *Aloe Vera* and *Chinensis*.

Characters.—In large dark reddish brown or almost black fragments, which are dull or smooth and glossy in appearance. The odour is strong, peculiar, and disagreeable. Taste bitter. In powder the drug is of a dark brown (or olive-green, if old) colour, the odour being very marked. Aloes is entirely soluble in 40 per cent. alcohol, and up to 75 per cent. in water.

Recognition.—The general appearance, colour, and smell distinguish aloes. The smell, which becomes more noticeable when the drug is breathed upon, is most peculiar, disagreeable, and characteristic. The student must carefully compare the odour with that of Socotrine Aloes. Compare this drug with Guaiacum Resin, which has a green tint and very little smell.

Composition.—Essential oil, resins, and a crystalline substance called 'Barbaloin' (see Aloin).

Prescribing.—See under Socotrine Aloes.

Dose.—2 to 5 grains.

Preparations.—1. *Extractum Aloes Barbadosis*—Extract of Barbadoes Aloes (A dry aqueous extract).
Dose : 1 to 4 grains.

Note that this preparation has nearly the same dose as aloes itself. It is simply aloes deprived of its resin.

2. *Decoctum Aloes Compositum*—Compound Decoction of Aloes (Extract of Barbadoes aloes, myrrh, carbonate of potassium, water, extract of liquorice; boil for five minutes, and add saffron, and when cold Compound Tincture of Cardamoms; stand for two hours and strain— $4\frac{1}{2}$ grains extract in 1 ounce). *Dose*: $\frac{1}{2}$ to 2 ounces.

3. *Pilula Aloes Barbadosensis*—Pill of Barbadoes Aloes (Barbadoes Aloes, hard soap, oil of caraway, confection of roses—1 in 2). *Dose*: 4 to 8 grains.

4. *Pilula Aloes et Ferri*—Pill of Aloes and Iron (Dried sulphate of iron, Barbadoes aloes, compound powder of cinnamon, syrup of glucose—1 in 9 Iron, 1 in $4\frac{1}{4}$ Aloes). *Dose*: 4 to 8 grains.

5. *Tinctura Aloes*—Tincture of Aloes (Extract of Barbadoes aloes, liquid extract of liquorice, alcohol 45 per cent. — 1 in 40 extract). *Dose*: $\frac{1}{2}$ to 1 drachm for repeated administration, $1\frac{1}{2}$ to 2 drachms for a single dose.

Barbadoes Aloes is also contained in Pil. Cambog. Co. (1 in 6), in Pil. Coloc. Co. (1 in 3), and Pil. Coloc. et Hyosey. (1 in $4\frac{1}{2}$).

*71. **Aloe Socotrina**—Socotrine Aloes, 'Hepatic Aloes,' Zanzibar Aloes.

Production.—The inspissated juice of the leaves of *Aloe Perryi* and other species.

Characters.—In large fragments. Colour various shades of reddish-brown, or it is sometimes liver-coloured (hepatic). Thin films are transparent and red, or orange-brown, but it is sometimes quite opaque. The odour is fruity and agreeable, especially marked in the powder, which is of a reddish-brown colour. Taste bitter. Soluble in 40 per cent. alcohol and in water (up to 50 per cent.).

Recognition.—The general appearance distinguishes this drug as an aloes. Compare it with Barbadoes Aloes, and note that the odour of Barbadoes Aloes is strong and very disagreeable, that of Socotrine Aloes fruity and agreeable. Barbadoes Aloes is often darker in colour than Socotrine Aloes, but the colour is not a reliable guide to distinction. In powder the two drugs are quite unlike in colour, and the difference between the odours is very marked.

Composition.—As that of Barbadoes Aloes. The Aloin is called 'Socaloin.'

Prescribing.—There is little to choose between the two aloes as medicines; the Barbadoes is perhaps the most used. Aloes is not used externally. Internally in pills, a little Compound Tincture of Cardamoms forming a ready excipient. One or other of the aloes enters into the composition of nearly all the aperient pills of the Pharmacopœia. The drug acts slowly, taking from fifteen to twenty hours before it exerts its purgative action. Aloes may also be given in enema or in mixtures by the compound decoction or tincture. The taste is nauseous, but is effectively disguised by the extract of liquorice used.

Dose.—2 to 5 grains.

Preparations.—1. *Pilula Aloes et Asafœtida*—Pill of Aloes and Asafœtida (Socotrine Aloes, asafœtida, hard soap, confection of roses—1 Aloes in 4, 1 Asaf. in 4).
Dose: 4 to 8 grains.

2. *Pilula Aloes et Myrrha*—Pill of Aloes and Myrrh. 'Pil. Rufi' (Socotrine Aloes, myrrh, syrup of glucose—1 Aloes in $2\frac{1}{2}$, 1 Myrrh in $4\frac{1}{2}$). *Dose*: 4 to 8 grains.

3. *Pilula Aloes Socotrine*—Pill of Socotrine Aloes (Socotrine Aloes, hard soap, oil of nutmeg, confection of roses—1 in 2). *Dose*: 4 to 8 grains.

Socotrine Aloes is also contained in Pil. Rhei Co. (1 in 6), Tinctura Benzoini Co. (1 in 60).

*72. **Aloin**—Aloin; $C_{16}H_{16}O_7$.

Production.—A crystalline neutral principle obtained from either variety of aloes by treatment with solvents and purified by recrystallization. Aloin obtained from Barbadoes Aloes is called 'Barbaloin,' that from Socotrine Aloes 'Soealoin'; the former is the one chiefly used. The medicinal action of the two is similar.

Characters.—A dull, brownish-yellow powder, possessing no smell, but having the peculiar nauseous bitter taste of aloes. Slightly soluble in water, more so in alcohol.

Recognition.—Note the peculiar brownish-yellow colour and the absence of smell. The colour varies considerably in different samples, from a light yellow to a light brown. Compare this powder with the other yellow powders to be recognised, Sublimed Sulphur, Yellow Oxide of Mercury, and Powdered Rhubarb, all of which are much brighter in colour, the last having a peculiar smell.

Composition.—Aloin is a complex phenol, and is allied to Anthracene.

Prescribing.—Aloin is largely ordered in pills, with such drugs as Nux Vomica, etc. It is occasionally used by hypodermic injection, a warm aqueous solution being employed.

Dose.— $\frac{1}{2}$ to 2 grains.

Cascara Sagrada—Sacred Bark, Rhamni Purshiani Cortex.

Production.—The dried bark of *Rhamnus Purshianus*.

Characters.—In incurved pieces of varying sizes; nearly smooth externally, and more or less completely covered with a grayish-white layer. The inside of the bark has a velvety appearance, and is of a dark chocolate brown; the edges of the bark are a cinnamon brown. There is no marked odour, and the taste is bitter.

Composition.—The bark contains three resins—brown, yellow, and red; a neutral crystalline principle; tannic, malic, and oxalic acids; and a little volatile oil. The purgative principle is considered by some authorities to be allied to that contained in Rhubarb root. It has received the name of 'Cascarin.'

Prescribing.—Pills of the extract may be ordered. In mixtures, the liquid extract. The taste of the drug is nauseous, and a little spirit of chloroform, syrup, or other flavouring agent should be ordered with it. The official aromatic syrup is a palatable preparation.

Preparations.—1. *Extractum Cascaræ Sagradæ*—Extract of Cascara Sagrada (A dry, aqueous extract made with cold water). *Dose*: 2 to 8 grains.

2. *Extractum Cascaræ Sagradæ Liquidum*—Liquid Extract of Cascara Sagrada (made by exhaustion with cold water, evaporation, and addition of diluted alcohol—1 = 1). *Dose*: $\frac{1}{2}$ to 1 drachm.

3. *Syrupus Cascaræ Aromaticus*—Aromatic Syrup of Cascara (Liquid extract, tincture of orange-peel, rectified spirit, cinnamon-water, syrup—1 in 2½ liquid extract. *Dose*: $\frac{1}{2}$ to 2 drachms.

*73. **Colocynthis Pulpa**—Colocynth Pulp, 'Bitter Apple.'

Production.—The dried and peeled fruit, without the seeds, of *Citrullus Colocynthis*.

Characters.—In light, white, spongy balls, about the

size of a small orange; or in fragments of these balls: they consist of the pulp of the fruit, with the seeds imbedded therein. The broken pulp, freed from the seeds, is alone to be used in medicine. The pulp is spongy, porous, and easily torn; it has no odour, and a very bitter taste.

Recognition.—When entire, the appearance of Colocynth apples is most characteristic, and they are easily recognised; they are occasionally seen unpeeled, covered with a thin, smooth, yellowish-brown rind. In fragments, the spongy, porous, tearable nature of the pieces distinguish colocynth. The seeds, which are usually present, are small, egg-shaped, and a light greenish-yellow colour; they contain much oil.

Composition.—A bitter glueoside, 'Colocynthin,' soluble in water and alcohol; mucilage and gummy matter (no starch or fixed oil should be present); 'Citrullin' and 'Colocynthitin,' resinous bodies insoluble in water.

Prescribing.—Colocynth is very rarely prescribed alone; it is generally ordered in pills with other purgatives, or with a carminative, such as Extract of Hyoscyamus. It is sometimes used in powder as an insecticide.

Dose.—1 to 6 grains.

Preparations.—1. *Extractum Colocynthidis Compositum*—Compound Extract of Colocynth (Colocynth, extract Barbadoes aloes, scammony resin, eurd soap, cardamoms, alcohol 60 per cent.—1 in $5\frac{1}{2}$).

The Colocynth is macerated in the spirit for four days, the spirit distilled off, the other drugs added, and the whole evaporated to a hard extract. *Dose*: 2 to 8 grains.

2. *Pilula Colocynthidis Composita*—Compound Pill of Colocynth (Colocynth, Barb. aloes, scammony resin, sulphate of potash, oil of cloves, water; mix—1 in $5\frac{1}{2}$). *Dose*: 4 to 8 grains.

3. *Pil. Coloc. et Hyoscyami*—Pill of Colocynth and Hyoscyamus (Pil. Coloc. Co., 2; Extract Hyoscyamus, 1). *Dose*: 4 to 8 grains.

*74. **Elaterium**—Elaterium, Extractum Elaterii.

Production.—The sediment from the juice of the fruit of *Ecballium Elaterium*, 'the Squinting Cucumber.' The fruit is cut in pieces, the juice lightly pressed out and strained. On allowing the juice to stand some time, the Elaterium deposits. It is filtered off (through linen), and dried in a warm place.

Characters.—In small, flat, or slightly-curved oblong cakes, or fragments of cakes, about $\frac{1}{10}$ inch thick. Colour buff, or sometimes greenish-yellow. No particular odour. The fragments are friable, and easily crumble; they are often marked on the convex side with the impression of a cloth. Taste bitter and acrid. The drug has a very powerful action.

Recognition.—No drug at all resembles Elaterium, so that its general appearance easily identifies it.

Composition.—A powerful neutral principle, 'Elaterin'; 'Ecballin,' or Elateric Acid, acrid and resinous; 'Prophetin'; a glucoside; and gummy matter. The Pharmacopœia directs that the official Elaterium should contain from 20 to 25 per cent. of Elaterin.

Prescribing.—In pills. The active principle, 'Elaterin,' is more certain in its action, and is preferable to Elaterium.

Dose.— $\frac{1}{10}$ to $\frac{1}{2}$ grain.

Elaterinum—Elaterin, 'Momordicin'; $C_{20}H_{28}O_5$.

Production.—A neutral body, the active principle of Elaterium.

Characters.—Small colourless crystals. Insoluble in water; slightly soluble in spirit. No odour; taste bitter.

Prescribing.—Elaterin may be given in pills by means of the compound powder, or that preparation may be given in powders. Be careful not to confound Elaterin with Elaterium.

Dose.— $\frac{1}{10}$ to $\frac{1}{10}$ grain.

Preparation.—*Pulvis Elaterini Compositus*—Compound Powder of Elaterin (Elaterin, sugar of milk—1 in 40). *Dose*: 1 to 4 grains.

*75. **Jalapa**—Jalap.

Production.—The dried tubercles (enlarged roots) of *Ipomœa Purga*.

Characters.—Jalap tubercles occur in various shapes and sizes—oblong, egg-shaped, turnip-shaped, and sometimes in an elongated form, tapering at each end. The tubercles vary in size from $\frac{1}{2}$ inch in diameter at the thickest part up to 2 or 3 inches, and are up to 4 or 5 inches long. Externally they are dark brown, irregularly and deeply furrowed and wrinkled; internally a brownish-yellow. There is no marked odour to the drug unless in powder.

Recognition.—The appearance of Jalap is most charac-

teristic, and easily enables it to be identified. In powder, the drug has a peculiar smoky, burnt odour and a yellowish-gray colour; the odour of the powder is characteristic, and should be carefully noticed.

Composition.—Jalap contains resin, also gum, sugar, and starchy matters. The official Jalap must contain from 9 to 11 per cent. of resin.

Prescribing.—Jalap may be given in pills by means of the extract, but is best ordered in powder with a carminative (*e.g.*, as Pulv. Jalapæ Comp.). The tincture in mixtures is but little used.

Dose (in powder).—5 to 20 grains.

Preparations.—1. *Extractum Jalapæ*—Extract of Jalap (Jalap is macerated successively with rectified spirit and water, the liquids evaporated, and the extracts so formed mixed and evaporated). *Dose*: 2 to 8 grains.

2. *Pulvis Jalapæ Compositus*—Compound Powder of Jalap (Jalap, acid tartrate of potassium, ginger—1 in 3). *Dose*: 20 to 60 grains.

3. *Tinctura Jalapæ*—Tincture of Jalap (Jalap, alcohol 70 per cent.; Percolation—1 in 5). Standardized to contain 1·5 per cent. of Jalap Resin. *Dose*: $\frac{1}{2}$ to 1 drachm.

Resina Jalapæ—Jalap Resin.

Production.—A resin prepared from Jalap. A tincture of Jalap is made with rectified spirit by digestion and percolation. Water is added to this tincture, which precipitates the resin, the spirit is distilled off, and the resin collected and dried.

Characters.—In dark-brown fragments, translucent and brittle. Odour peculiar, cheese-like; taste acrid. Insoluble in water, soluble in spirit.

Composition.—Jalap Resin consists of two bodies, one soluble in ether, 'Jalapin,' and one insoluble in ether, 'Convolvulin.' Both these bodies are of glucosidal nature. The official Jalap Resin should not yield more than 10 per cent. to ether.

Prescribing.—Jalap Resin is given in pills. A purified and powdered form of the resin is used under the name of 'Jalapin'; this is a light-yellow powder, with the peculiar smell of Jalap Resin.

Dose.—2 to 5 grains.

Podophylli Rhizoma—Podophyllum Rhizome. Podophylli Radix. 'May apple,' 'Mandrake.'

Production.—The dried Rhizome (underground stem) of *Podophyllum Peltatum*.

Characters.—In pieces of various length, and up to $\frac{1}{2}$ inch thick. The pieces are of a more or less flattened oval shape. Colour a dark reddish-brown, appearance knotty, and marked, especially at the knots, with numerous circular white sears, where the rootlets have been broken off. Brittle, the fractured surface white, with a single ring. No particular odour. Taste bitter.

Composition.—The drug owes its activity to a resinous body called 'Podophyllin' (see below).

Prescribing.—There are no preparations of the rhizome besides the resin, and it is not used except to prepare the resin.

Podophylli Resina.—Resin of *Podophyllum*. 'Podophyllin.'

Production.—*Podophyllum* rhizome is exhausted by percolation with rectified spirit; the spirit is distilled off, and the concentrated tincture poured into three times its volume of water, acidulated with hydrochloric acid. The separated resin is collected, washed, and dried.

Characters.—A brownish-yellow powder, with a peculiar resinous smell. Insoluble in water, soluble in spirit.

Composition.—The resin contains 'Podophyllotoxine,' a purgative crystalline body, which can be split into 'Pieropodophyllic Acid' and 'Pieropodophyllin.' These also exist free in the resin; the latter is said to be most active.

Prescribing.—Podophyllin is usually ordered in pills, with other purgative or alterative drugs. The tincture precipitates with water, and should be dispensed with mucilage.

Dose.— $\frac{1}{4}$ to 1 grain.

Preparation.—*Tinctura Podophylli*.—Tincture of *Podophyllum* (Podophyllin resin, rectified spirit—2 grains in 1 drachm). *Dose*: 5 to 15 minims.

*76. **Rhei Radix**.—Rhubarb Root, 'Turkey Rhubarb.'

Production.—The sliced and dried root, deprived of its Bark, of *Rheum Palmatum*, *Officinale*, and other species. From China and Thibet.

Characters.—Rhubarb Root occurs in pieces of nearly all sizes and shapes—cylindrical, angular, barrel-shaped, etc. Pieces of the best quality are small and angular,

each piece covered with the orange-yellow powdered drug, and often having a small hole running through near the middle. Externally the drug is marked with fine dark-red lines, intermixed with the yellowish-brown substance of the root. The root is hard and compact, and when broken or cut presents a peculiar marbled red and white appearance. The odour is most peculiar, taste slightly bitter, astringent and gritty.

Recognition.—The very characteristic odour, red-veined or marbled appearance, and the orange-yellow colour, at once distinguish rhubarb root. Compare the colour of the powdered root with that of Yellow Oxide of Mercury, and note the difference in weight and odour.

Composition.—Rhubarb Root contains an important purgative principle, 'Cathartic Acid' (also present in Senna); a variety of tannic acid, 'Rheotannic Acid'; a yellow colouring matter, 'Chrysophan'; and about 35 per cent. of Oxalate of Calcium in the form of 'Raphides.' This combination of a purgative with an astringent principle is unusual. It should be remembered as explaining the medicinal action of rhubarb.

Prescribing.—Powdered Rhubarb is sometimes used externally in the form of ointment. Internally in powders or pills. In mixtures, by means of the tincture and syrup. A carminative is always combined with it.

Dose.—3 to 10 grains for repeated administration, 15 to 30 grains for a single dose.

Preparations.—1. *Extractum Rhei*—Extract of Rhubarb (Alcoholic extract). *Dose*: 2 to 8 grains.

2. *Infusum Rhei*—Infusion of Rhubarb (Rhubarb, water; fifteen minutes—1 ounce in 1 pint). *Dose*: $\frac{1}{2}$ to 1 ounce.

3. *Liquor Rhei Concentratus*—Concentrated Solution of Rhubarb (Rhubarb percolated with alcohol 20 per cent.—1 in 2). *Dose*: $\frac{1}{2}$ to 1 drachm.

4. *Pilula Rhei Composita*—Compound Pill of Rhubarb (Rhubarb, Socotrine aloes, myrrh, soap, oil of peppermint, syrup of glucose—1 in 4 nearly). *Dose*: 4 to 8 grains.

5. *Pulvis Rhei Compositus*—Compound Powder of Rhubarb, 'Gregory's Powder' (Rhubarb, heavy or light magnesia, ginger—1 in 4 $\frac{1}{2}$). *Dose*: 20 to 60 grains.

6. *Syrupus Rhei*—Syrup of Rhubarb (Rhubarb Root and coriander fruit in powder are treated by percolation

with spirit and water ; the liquid is evaporated, and sugar dissolved in the concentrated liquid). *Dose* : $\frac{1}{2}$ to 2 drachms.

7. *Tinctura Rhei Composita*—Compound Tincture of Rhubarb (Rhubarb, cardamoms, coriander, glycerine, alcohol 60 per cent. ; the glycerine is added after the tincture is finished—2 ounces in the pint ; Percolation). *Dose* : $\frac{1}{2}$ to 1 drachm for repeated administration, 2 to 4 drachms for a single dose.

*77. **Senna Alexandrina**—Alexandrian Senna.

Note.—There are two varieties of Senna used in Pharmacy—Alexandrian and Indian. Either of these may be used to make medicinal preparations of senna. Their composition and medicinal action are practically identical ; they differ slightly in their characters.

Production.—The dried leaflets of *Cassia Acontifolia*, imported from Alexandria.

Characters.—Narrow, pointed leaves, from $\frac{3}{4}$ inch to 1 $\frac{1}{4}$ inches long, and $\frac{1}{4}$ to $\frac{1}{2}$ inch broad at their widest part. They are generally much broken. A few oblong leaves about $\frac{1}{2}$ inch broad are occasionally mixed with them. The leaves are a pale yellowish-green colour, and possess a faint tea-like odour. Taste nauseous and gummy.

Recognition.—The general appearance, colour, shape and size distinguish senna. On looking at a leaf, it will be seen that the blade of the leaf extends further down one side of the mid-rib towards the base than it does down the other. This feature of the leaf ('unequal at the base') is very characteristic of senna, and distinguishes it from leaves of similar appearance.

*78. **Senna Indica**—East Indian Senna, Tinnivelly Senna.

Production.—The dried leaflets of *Cassia Angustifolia* from Southern India.

Characters.—The leaves are up to 2 inches in length, and unbroken, and are all the same shape. The colour is more uniform, and a little darker than that of Alexandrian Senna ; other characters the same.

Recognition.—Compare the Alexandrian with the Indian Senna, and note that the latter is much larger, usually not broken, and more uniform in size and colour. Both are unequal at the base.

Composition.—Both Sennas contain a purgative glucoside, 'Cathartic Acid,' soluble in water and diluted spirit,

but not in strong alcohol. It exists in combination with calcium and magnesium. A yellow colouring matter, 'Chrysophan,' and resinous bodies, 'Sennacrol' and 'Sennapicrin,' insoluble in water. A peculiar sugar. 'Catharto mannite,' is also present.

Prescribing.—Senna may be given in powder; the Compound Liquorice Powder is an elegant form. Confection of Senna is also an agreeable vehicle for exhibiting senna. The infusion, syrup, and compound mixture are much used. The tincture is rarely prescribed. Senna, like Rhubarb, is always combined with a carminative. Liquorice entirely covers the nauseous taste.

Dose (in powder).—10 to 30 grains.

Preparations.—1. *Confectio Sennæ*—Confection of Senna—'Lenitive Electuary' (Senna, coriander fruit, figs, tamarinds, cassia pulp, prunes, extract of liquorice, sugar, water). The prunes and figs are boiled in water, the tamarinds and cassia pulp added, the whole digested, and the pulpy mass rubbed through a sieve. To this semi-solid matter the sugar, extract of liquorice and coriander, and senna in fine powder, are added, and the whole well mixed. The resulting compound is a black paste, with a fragrant smell and agreeable taste. *Dose*: 1 to 2 drachms.

2. *Infusum Sennæ*—Infusion of Senna (Senna, ginger, boiling water; fifteen minutes—2 ounces to 1 pint). *Dose*: $\frac{1}{2}$ to 1 ounce, or, as a single draught, 2 ounces.

3. *Liquor Sennæ Concentratus*—Concentrated Solution of Senna (Senna macerated and percolated with distilled water, and alcohol and tincture of ginger added—1 in 1). *Dose*: $\frac{1}{2}$ to 1 drachm.

4. *Pulvis Glycyrrhizæ Compositus*—Compound Powder of Liquorice (Senna, liquorice root, fennel, sulphur, sugar—1 in 6).—*Dose*: 1 to 2 drachms.

5. *Mistura Sennæ Composita*—Compound Mixture of Senna, 'Black Draught,' Haustus Niger (Sulphate of magnesium, liquid extract of liquorice, aromatic spirit of ammonia, compound tincture of cardamoms, infusion of senna—1 in 4, Epsom Salts). *Dose*: 1 to 2 ounces.

6. *Syrupus Sennæ*—Syrup of Senna (Senna exhausted by maceration and expression with 20 per cent. alcohol, the liquid evaporated, and sugar dissolved in it, and lastly oil of coriander dissolved in alcohol added). *Dose*: $\frac{1}{2}$ to 2 drachms.

7. *Tinctura Sennæ Composita*.—Compound Tincture of Senna (Senna, raisins, caraway, coriander, alcohol 45 per cent.; Maceration—1 in 5). *Dose*: $\frac{1}{2}$ to 1 drachm for repeated administration, 2 to 4 drachms for a single dose.

Group XXIII.—Camphor, Turpentine and Cantharides.

*79. *Camphora*.—Camphor.

Production.—A steareptene (solid volatile oil) prepared from the wood of *Cinnamomum Camphora*. The wood is distilled with water, the Camphor is carried over with the steam, collected and resublimed.

Characters.—A colourless, translucent, crystalline solid. It may be in irregular fragments, in cakes, in large rings, or in a fine granular powder, 'Flowers of Camphor.' Odour powerful, peculiar, and penetrating. Soluble in rectified spirit, chloroform, turpentine, ether, and fixed oils, slightly so in water. It can be easily powdered if moistened with a little spirit. It forms a fluid, oily compound when rubbed with Carbolic Acid, Chloral Hydrate, or Thymol. It is inflammable.

Recognition.—Camphor is at once recognised by its appearance and very characteristic smell.

Composition.—It is an oxidized volatile oil, and has the empirical formula $C_{10}H_{16}O$. It is thus closely allied to Turpentine and the essential oils.

Prescribing.—Externally Camphor is used in most liniments. It is a weak antiseptic, and is often used as a preservative. The compound with Chloral Hydrate is anodyne. Internally Camphor may be given in pills, made with a little soap and dilute spirit, or spirit of camphor may be used dropped upon sugar. *Aqua Camphoræ* is much used as a vehicle.

Dose.—2 to 5 grains.

Preparations.—1. *Aqua Camphoræ*.—Camphor-water, 'Camphor Julep,' 'Mistura Camphoræ' (70 grains are dissolved in 1 ounce of rectified spirit, and added to a gallon of distilled water—about $\frac{1}{2}$ grain in 1 ounce). *Dose*: 1 to 2 ounces.

2. *Linimentum Camphoræ*.—Camphor Liniment, Camphorated Oil (Camphor, olive-oil; dissolve—1 to 4).

3. *Linimentum Camphoræ Ammoniatum*.—Ammoni-

ated Camphor Liniment, Compound Camphor Liniment (Camphor, oil of lavender, strong ammonia, rectified spirit—1 in 9).

The chief active body in this preparation is free ammonia.

4. *Spiritus Camphoræ*—Spirit of Camphor (Camphor, rectified spirit—1 to 9). *Dose*: 5 to 20 minims.

5. *Tinctura Camphoræ Composita*—Compound Tincture of Camphor. 'Paregoric,' 'Paregoric Elixir' (Tincture of opium, benzoic acid, camphor, oil of aniseed, alcohol 60 per cent.— $\frac{1}{4}$ grain Opium, $\frac{3}{16}$ Camphor in 1 drachm). *Dose*: $\frac{1}{2}$ to 1 drachm.

Camphor is contained in all the Linimenta (except Ammonia, Calcis, Crotonis, Opii and Potas. Iodid.), and in Unguent. Hydrarg. Comp.

*80. **Oleum Terebinthinæ**—Oil of Turpentine. Turpentine, 'Spirits of Turpentine.'

Production.—The essential oil distilled from the oleoresin (crude turpentine) of *Pinus Sylvestris* and other species of *Pinus*.

Characters.—A colourless liquid, mobile, and with a powerful penetrating odour. Very inflammable. Dissolves essential and fixed oils, fat, wax and resins.

Recognition.—Turpentine is easily recognised by its peculiar odour and colourless nature.

Composition.—Turpentine consists of a mixture of several hydrocarbons, 'Terpenes,' of the formula $C_{10}H_{16}$. Nearly all the essential oils contain a hydrocarbon of this empirical formula, and on keeping some of them often spontaneously change into a body resembling turpentine.

Prescribing.—Turpentine is powerfully antiseptic and disinfectant, and destructive to insect life. Externally it is used in liniment, or applied on flannel or lint ('Turpentine Stupes'). Internally, in mixture with a suspending agent. Turpentine is also given by enema.

Dose.—2 to 10 minims, or as an anthelmintic 3 to 4 drachms.

Preparations.—1. *Linimentum Terebinthinæ*—Liniment of Turpentine (Soft soap, water, camphor, oil of turpentine—13 in 20).

2. *Linimentum Terebinthinæ Aceticum*—Acetic Turpentine Liniment (Turpentine, glacial acetic acid, liniment of camphor—4 turpentine and 1 acid in 9).

Resina—Resin, 'Rosin.'

Production.—The solid residue from the distillation of Crude Turpentine. The Oleo-Resin of Turpentine ('Crude Turpentine,' 'Venice Turpentine') is distilled, oil of turpentine passes over, and resin is left behind.

Characters.—In irregular, angular, or rounded fragments, which are opaque (from the presence of water), or clear and translucent. The colour varies from a pale yellow to a deep red. Odour not marked, unless warmed, then turpentine-like. Soluble in turpentine and alkalies.

Composition.—Resin consists chiefly of an organic acid, 'Abietic Acid.' This can be converted into a soluble salt by alkalies, 'Resin Soap,' hence resin is much used in soap-making.

Prescribing.—Not often used internally—when so, in pills. Externally in ointments and plasters. 'Resin Soap' is a useful emulsifying agent.

Preparations.—1. *Emplastrum Resinæ*—Resin Plaster, 'Adhesive Plaster' (Resin, lead plaster, hard soap—2 in 19).

2. *Unguentum Resinæ*—Resin Ointment (Resin, yellow wax, olive-oil, and lard—4 in 15). Also used in many of the plasters.

Terebenum—'Terebene,' 'Pure Terebene.'

Production.—By treatment of turpentine with sulphuric acid and subsequent distillation.

Characters.—A colourless liquid with a peculiar pine-wood-like odour. Inflammable, and in other properties resembling turpentine. Insoluble in water.

Composition.—It consists chiefly of a terpene, 'Dipentene,' $C_{10}H_{16}$; this is isomeric with 'Pinene,' the chief constituent of turpentine, but differs from it in being optically inactive.

Prescribing.—May be taken dropped on sugar, or suspended in water with gum or tragacanth.

Dose.—5 to 15 minims.

***81. Cantharis**—Cantharides, 'Spanish Fly,' 'Blistering Fly.'

Production.—The entire beetle, *Cantharis Vesicatoria*.

Characters.—The beetles are up to an inch long, and about a quarter of an inch broad, with two long wing-sheaths of an iridescent coppery green, covering the whole of the back. The under surface of the body and the legs

have also a metallic appearance, and frequently bear a number of small light-brown parasites. The wings are brown and membranous. The odour of the drug is powerful and offensive.

Recognition.—The entire beetle is at once recognised. The powder is of a dark-brown colour, exhibiting small shining fragments of the wing-cases; by this character and the odour, which is very offensive and characteristic, it may be easily identified.

Composition.—A powerful active principle, 'Cantharidin' (up to 1 per cent.), obtainable in colourless, shining crystals, soluble in alcohol and acetic acid; a volatile oil and a green fixed oil or fat.

Prescribing.—Externally, Cantharides is very largely used as a blistering agent, in plasters, ointments, liquors, etc. It is also the active ingredient in most preparations for stimulating the growth of the hair. It is not often used internally—when so, by tincture only in mixture.

Preparations.—1. *Acetum Cantharidis*—Vinegar of Cantharides (Cantharides, glacial acetic acid, distilled water; Maceration and Percolation—1 in 10).

2. *Emplastrum Calcfaciens*—Warming Plaster (Cantharides in powder, yellow wax, resin, resin plaster, soap plaster, boiling water). The Cantharides is infused in the water, pressed, strained, and evaporated to one-third, the other ingredients melted, and the whole mixed together—1 in 24).

3. *Emplastrum Cantharidis*—Cantharides Plaster (Cantharides, yellow wax, soap plaster, lard, resin—1 in 3). Blisters are spread of it on adhesive plaster spread on calico.

4. *Liquor Epispasticus*—Blistering Liquid (Cantharides, acetic ether; Percolation—1 in 2).

5. *Collodium Vesicans*—Blistering Collodion (Pyroxylin dissolved in Blistering Liquid—1 in 40).

6. *Tinctura Cantharidis*—Tincture of Cantharides (Cantharides, rectified spirit; Maceration—1 in 80).
Dose: 5 to 15 minims, or if frequently repeated, 2 to 5 minims.

7. *Unguentum Cantharidis*—Ointment of Cantharides (Cantharides is digested in melted benzoated lard for twelve hours and strained—1 in 10).

Group XXIV.—Benzoin and Benzoic Acid.

Benzoinum—Benzoin, 'Gum Benjamin.'

Production.—A balsamic resin obtained from *Styrax Benzoin*.

Characters.—Benzoin occurs in two forms: Siam Benzoin, in small light-red tears or pieces, which are milky white in their interior; Sumatra, in large lumps, which have a white and reddish-brown marbled, mottled, or granite-like appearance. Both kinds have an agreeable fragrant odour, which is very characteristic. The resin is soluble in spirit and in solutions of strong alkalies.

Composition.—Several Resins, 'Benzoic Acid' (up to 20 per cent.), and a volatile oil, 'Styrol,' on which the odour depends. 'Cinnamic Acid' is also often present.

Prescribing.—Chiefly used as a preservative and perfuming agent (*e.g.*, in 'Incense'). The compound tincture is much used as an application to cuts and wounds, and is also given internally in mixtures with mucilage.

Preparations.—1. *Adeps Benzoinatus*—Benzoated Lard (Prepared lard, benzoin, in coarse powder—3 per cent.). The lard is melted, the benzoin added, and the mixture digested with heat for two hours, and strained. The lard dissolves essential oil and benzoic acid, which act as preservatives, and prevent it from becoming rancid.

2. *Tinctura Benzoini Composita*—Compound Tincture of Benzoin, 'Friar's Balsam' (Benzoin, storax, balsam of tolu. socotrine aloes. rectified spirit; Maceration—1 in 10). *Dose*: $\frac{1}{2}$ to 1 drachm.

*82. **Acidum Benzoicum**—Benzoic Acid; $\text{HC}_7\text{H}_5\text{O}_2$.

Production.—An acid prepared from Benzoin, or by chemical means from Toluene, etc.

Characters.—In white or slightly yellow, shining, feathery plates or needles. Prepared by the sublimation of Benzoin, it has the peculiar aromatic odour of that drug; prepared from Toluene, etc., it is odourless. Velvety to the touch. Slightly soluble in water (1 in 400), freely in spirit (1 in 4).

Recognition.—The shining appearance and soft feel distinguish Benzoic Acid. The acid generally used in medicine is made by the sublimation of Benzoin, and then has its peculiar aromatic odour. (Compare the drug

with Salicylic Acid, which is of a different appearance, has a harsh feel, and is irritating to the nostrils; with Quinine, which is in smaller crystals and is soft to the touch; with Santonin, which is in large shining crystals; and with Tannic Acid, buff-coloured, and Gallic Acid, fawn-coloured.

Prescribing.—Sometimes used externally in ointments; locally lozenges are valuable, and much used. Internally it may be given in mixture with a suspending agent, but it is better to use the soluble benzoates.

Dose.—5 to 15 grains.

Incompatibles.—See Sodii Benzoas.

Preparation.—*Trochiscus Acidi Benzoici*—Benzoic Acid Lozenge ($\frac{1}{2}$ grain in each), with the Fruit basis.

Benzoic Acid is also contained in Tinct. Camph. Co. and Tinct. Opii Ammoniata.

Ammonii Benzoas—Benzoate of Ammonium;



Production.—By dissolving benzoic acid in a solution of ammonia, evaporating, and crystallizing.

Characters.—Colourless or slightly buff-coloured, pearly scales. Soluble in water (1 in 6), in spirit (1 in 30). Usually has the aromatic odour of benzoin.

Prescribing.—In solution. Note the Incompatibles.

Dose.—5 to 15 grains.

Incompatibles.—Iron Salts, Acids, and Alkalies.

Sodii Benzoas—Benzoate of Sodium; $\text{NaC}_7\text{H}_5\text{O}_2$.

Production.—By neutralizing benzoic acid with solution of carbonate of sodium, and evaporating to dryness.

Characters.—Small white granular masses, or a white powder. Little or no odour. Very soluble in water; in spirit (1 in 24). Taste sweetish.

Prescribing.—As the Ammonium Salt.

Dose.—5 to 30 grains.

Incompatibles.—Iron Salts and Acids.

Group XXV.—Tannic Acid and other Astringents.

*83. **Acidum Tannicum**—Tannic Acid. ‘Tannin,’ Digallic Acid; $\text{C}_{14}\text{H}_{10}\text{O}_9 \cdot 2\text{H}_2\text{O}$.

Production.—A substance obtained from Galls by fermentation of the galls and extraetion with aqueous ether.

Characters.—Pale buff-coloured, crystalline powder or

small masses. Very light and soft to the touch, and with a faint peculiar odour. Taste very astringent. Soluble in water (1 in 1), freely in spirit, and in glycerine (1 in 1). Almost insoluble in pure ether.

Recognition.—Tannic Acid is easily recognised by its colour, general appearance, and faint but peculiar odour. Some samples of benzoic acid have about the same colour, but the aromatic odour and shining appearance of the latter easily distinguish it.

Prescribing.—Tannic Acid may be applied dry, as a styptic to bleeding surfaces. Ointments, lotions, and injections containing it are largely used. Internally Tannic Acid may be given in solution (note the incompatibles); the glycerine as an application to the throat is much employed. Lozenges and suppositories are also popular.

Dose.—2 to 5 grains.

Incompatibles.—All Alkaloids and preparations containing them; Antipyrin, Iron, Lead, Silver, Copper, Mercury, and Antimony Salts; Gelatinous matter. Emulsions are usually curdled by Tannic Acid.

Preparations.—1. *Glycerinum Acidi Tannici*—Glycerine of Tannic Acid (Tannic Acid, glycerine—1 to 5).

2. *Suppositoria Acidi Tannici*—Suppositories of Tannic Acid (Tannic Acid, oil of theobroma—3 grains in each).

3. *Trochiscus Acidi Tannici*—Tannic Acid Lozenge ($\frac{1}{2}$ grain in each), with the Fruit basis.

These preparations should not be brought into contact with iron vessels or implements.

***84. Acidum Gallicum**—Gallic Acid, Trihydroxy Benzoic Acid; $C_7H_6O_5 \cdot H_2O$.

Production.—By boiling powdered galls with dilute sulphuric acid; the mixture is strained through calico, and the strained liquid on cooling deposits the gallic acid.

Characters.—Pale fawn-coloured, needle-shaped crystals, or crystalline powder. No odour; taste acid, not astringent. But little soluble in water (1 in 100). Soluble in spirit (1 in 5), and in glycerine (1 in 12).

Recognition.—Gallic Acid is recognised by its colour, the shape of its crystals, and the absence of odour. Other similar shaped bodies are white or have an odour.

Prescribing. Internally in mixtures. The gallic acid

should be powdered as finely as possible, and suspended with mucilage.

Dose.—5 to 15 grains.

Incompatibles.—Metallic salts, especially iron, Spirit of Nitrous Ether. Does not precipitate gelatine.

Gallæ—Galls, 'Gall Nuts.'

Production.—Excrescences produced by the puncture of an insect (*Cynips Gallæ Tinctoria*) in the wood of a species of oak, the *Quercus Infectoria*.

Characters.—Hard spherical masses, from $\frac{1}{2}$ inch to $\frac{3}{4}$ inch in diameter. Dark olive green externally, with numerous small conical projections. Internally buff-coloured and slightly glossy, with a small central cavity. No odour; taste astringent.

Composition.—Tannic Acid, up to 70 per cent. Gallic Acid is also present in the free state up to 3 per cent. Resin and Sugar.

Prescribing.—Not internally, since tannic and gallic acids are better. Externally the two ointments are much used.

Incompatibles.—As those of Tannic and Gallic Acids.

Preparations.—1. *Unguentum Gallæ*—Ointment of Galls (Galls in powder, benzoated lard—1 in 5).

2. *Unguentum Gallæ cum Opio*—Ointment of Galls with Opium (Ointment of Galls, powdered opium—32 grains Opium in 1 ounce).

*85. **Kino**—Kino.

Production.—The juice (naturally dried) from the trunk of *Pterocarpus Marsupium*.

Characters.—In small shining black or reddish-black fragments, translucent and ruby red at the edges. No smell; taste astringent; tinges the saliva blood red. Soluble in rectified spirit, and partially so in water.

Recognition.—The appearance of the small shining fragments of Kino is peculiar, and easily enables it to be identified. Do not confound it with Aloes in small pieces (which have an odour), or with Guaiacum Resin, which is tinged with green.

Composition.—A variety of Tannic Acid, known as 'Kino-tannic Acid,' up to 75 per cent. ('Kino red' is a decomposition product of this body), and a small quantity of 'Pyrocatechin.'

Prescribing.—Kino is not used externally. Internally

generally by its compound powder (remember that this preparation contains opium), and in mixtures by the tincture.

Dose.—5 to 20 grains.

Incompatibles.—Iron and all Metallic Salts, Gelatine, Mineral Acids, Alkalies and their Carbonates, Antipyrin.

Preparations.—1. *Pulvis Kino Compositus*—Compound Powder of Kino (Kino, opium, cinnamon—3 in 4 Kino, 1 in 20 Opium). *Dose* : 5 to 20 grains.

2. *Tinctura Kino*—Tincture of Kino (Kino, glycerine, water, rectified spirit; Maceration—1 in 10). *Dose* : $\frac{1}{2}$ to 1 drachm.

The glycerine is added to prevent the tincture from becoming gelatinous.

Kino is also contained in *Pulvis Catechu Comp.*

*86. **Catechu**—*Catechu Pallidum*, 'Gambier.'

Production.—A dry extract of the leaves and young shoots of *Uncaria Gambier*.

Characters.—In cubes about an inch square on each side. Externally a dirty reddish-brown, internally a pale reddish-brown, and exhibiting a peculiar clay-like structure. Easily broken. No odour, taste sweetish and astringent. Entirely soluble in hot water.

Recognition.—The peculiar clay-like appearance of Catechu at once distinguishes it. Remember that it is an extract, and not a natural product.

Composition.—A crystalline substance, 'Catechin' or 'Catechuic Acid'; this body, by the action of the saliva and other agents, becomes converted into a variety of tannic acid, called 'Catechutannic Acid.' This also exists in Catechu in the free state.

Prescribing.—Not used externally. Internally the tincture in mixtures is much used. The compound powder is useful for children, and the lozenge (owing to the reaction with the saliva stated above) is a favourite local astringent.

Dose.—5 to 15 grains.

Incompatibles.—Iron and Metallic Salts, Alkalies, Gelatine, Antipyrin.

Preparations.—1. *Pulvis Catechu Compositus*—Compound Catechu Powder (Catechu, kino, rhatany, cinnamon, nutmeg—1 in 2½). *Dose* : 10 to 40 grains.

2. *Tinctura Catechu*—Tincture of Catechu (Catechu,

cinnamon, alcohol 60 per cent.; Maceration—1 in 5).
Dose: $\frac{1}{2}$ to 1 drachm.

3. *Trochiscus Catechu*—Lozenge of Catechu (1 grain in each), with the Simple basis.

Hamamelidis Cortex—Hamamelis Bark, 'Witch Hazel' Bark.

Production.—The dried bark of *Hamamelis Virginiana*.

Characters.—In thin, slightly-curved pieces, gray outside, marked with small brown oval protuberances (lenticels). Interior, a light cinnamon brown, fibrous. No odour; taste slightly astringent.

Composition.—A small quantity of volatile oil, tannin, and a volatile principle. The exact composition is not known.

Prescribing.—See *Hamamelidis Folia*.

Incompatibles.—Antipyrin, Metallic Salts, especially Iron.

Preparation.—*Tinctura Hamamelidis*—'Tincture of Hamamelis (Hamamelis bark, alcohol 45 per cent.; Percolation—1 in 10). *Dose*: $\frac{1}{2}$ to 1 drachm.

Hamamelidis Folia—Hamamelis Leaves, 'Witch Hazel' Leaves, 'Winter Bloom.'

Production.—The fresh and dried leaves of *Hamamelis Virginiana*.

Characters.—Oval leaves from 4 to 6 inches long; the apex is blunt, and the edge toothed and wavy. The under surface of the leaf has prominent veins. No particular odour. Taste bitter and astringent.

Composition.—See *Hamamelis Bark*.

Prescribing.—Hamamelis is used externally in the form of ointment made with the liquid extract. A distilled preparation of the leaves (a colourless liquid with a peculiar smell), known as 'Hazeline,' is popular as an external application to piles, etc. The official '*Liquor Hamamelidis*' is intended to replace this. Internally, the tincture or liquid extract in mixtures.

Incompatibles.—See *Hamamelis Bark*.

Preparations.—1. *Extractum Hamamelidis Liquidum*—Liquid Extract of Hamamelis (Hamamelis bark, alcohol 45 per cent.; Percolation and Evaporation—1 = 1). *Dose*: 5 to 15 minims.

2. *Liquor Hamamelidis*—Solution of Hamamelis (Fresh leaves are macerated with diluted alcohol, and the

mixture distilled). A colourless liquid with peculiar smell.

3. *Unguentum Hamamelidis*—Ointment of Hamamelis (Liquid extract, hydrous wool fat; mix—1 in 10).

Group XXVI.—Copaiba and Cubebs.

*87. **Copaiba**—Copaiba, Copaiva, Balsam of Copaiba, Oleo-resin of Copaiba.

Production.—An oleo-resin obtained from the trunk of *Copaifera Lansdorffii*.

Characters.—A light-yellow, or yellowish-brown, thick liquid. Sometimes slightly fluorescent. Odour peculiar, persistent, and very disagreeable. Insoluble in water, soluble in rectified spirit, and in fixed and volatile oils.

Recognition.—Copaiba is at once recognised by its appearance and peculiar, unpleasant smell.

Composition.—The drug is an oleo-resin, *i.e.*, a resin dissolved in a volatile oil. It is incorrectly called a Balsam. The volatile oil varies in amount up to 60 per cent. The resin is acid and consists chiefly of 'Copaivic Acid'; it is often given in pills in doses of 10 to 20 grains. A bitter principle is also said to be present.

Prescribing.—Not used externally. Internally small doses may be given in pills, but capsules are a more suitable form; these generally contain 25 minims in each, and may be made of gelatine or gut; the latter kind are not dissolved until they reach the intestine. Copaiba is also much used in mixtures; it may be emulsified with mucilage or saponified with potash. The taste is disgusting, and should be disguised as much as possible, and the drug not given on an empty stomach.

Dose.— $\frac{1}{2}$ to 1 drachm.

Oleum Copaibæ—Oil of Copaiba.

Production.—The essential oil obtained by distilling copaiba.

Characters.—A colourless or pale-yellow oil. It is thin when fresh, but on keeping some time becomes thick and viscid. It possesses the smell and taste of copaiba. Soluble in spirit.

Prescribing.—In capsules or in mixture with mucilage or yolk of egg.

Dose.—5 to 20 minims.

*88. **Cubeba**—Cubebs, 'Tailed Pepper.'

Production.—The dried, full-grown, but unripe, fruit of *Piper Cubeba*.

Characters.—Small globular fruits about $\frac{1}{8}$ inch in diameter. Black or brownish-black. The surface of each fruit is much wrinkled and tapers into a rounded stalk. The whole fruit much resembles a large black peppercorn mounted on a stalk. The odour of the fruit is strong, and peculiar and somewhat suggestive of camphor.

Recognition.—The wrinkled black appearance of the fruit, with the stalk attached, and the very characteristic odour at once identify cubebs. The stalk varies in length from $\frac{1}{8}$ inch, or less, up to $\frac{1}{2}$ inch. In powder cubebs has a reddish-brown colour, and the peculiar odour is very marked.

Composition.—A white crystalline substance, 'Cubebin,' said to resemble in its properties the principle of pepper, Piperine. A resin consisting chiefly of 'Cubebic Acid,' and about 15 per cent. of an essential oil.

Prescribing.—Not used externally. Cubebs are used locally in lozenges (for the throat); in mixtures, with a suspending agent. A common form of exhibiting it is in the form of boluses. A dose is made into a paste with syrup, the mass wrapped in wafer-paper, and swallowed. It is often given associated with Copaiba.

Dose.— $\frac{1}{2}$ to 1 drachm.

Preparation.—*Tinctura Cubebæ*—Tincture of Cubebs (Cubebs, rectified spirit; Percolation—1 in 5). *Dose*: $\frac{1}{2}$ to 1 drachm.

Oleum Cubebæ—Oil of Cubebs.

Production.—The essential oil distilled from Cubebs.

Characters.—A thin, colourless or greenish-yellow fluid. Smells strongly of Cubebs. Soluble in spirit.

Composition.—Contains a neutral hydrocarbon, 'Cubebene,' and a solid crystalline substance, 'Cubeb Camphor.'

Prescribing.—In capsules or in mixture with mucilage. Sometimes given by inhalation.

Dose.—5 to 20 minims.

Group XXVII.—Colchicum.

*89. **Colchici Cormus** — Colchicum Corm. 'Meadow Saffron' Corm.

Production.—The fresh, or sliced, and dried corm (solid, enlarged, underground stem) of *Colchicum Autumnale*.

Characters.—In slices about $\frac{1}{8}$ inch thick, of a well-marked kidney shape. The edges covered with a light-brown layer, with more or less distinct furrows. Flat surfaces, white or slightly yellow, with a rough, mealy appearance. No odour.

Recognition.—The peculiar kidney-shaped appearance at once distinguishes *Colchicum Corm*. It is not so well marked in some pieces as in others, but is always observable. The slices vary in breadth, but are rarely more than an inch across at their widest part.

Composition.—An alkaloid, 'Colchicine,' crystalline and soluble in water, decomposed by acids into 'Colchiceine'; about 10 per cent. of Starch, together with resin, tannin, and sugar.

Prescribing.—*Colchicum Corm* can be given in pills, using the powdered drug or the extract. In mixtures the *Vinum* is most used.

Dose (in powder).—2 to 5 grains.

Incompatibles.—Astringent drugs, Tinctures of Iodine and Guaiacum, Ferric Salts, Acids.

Preparations.—1. *Extractum Colchici*—Extract of *Colchicum* (a fresh extract). *Dose*: $\frac{1}{4}$ to 1 grain.

2. *Vinum Colchici*—Wine of *Colchicum* (*Colchicum corm*, Sherry; Maceration—1 in 5). *Dose*: 10 to 30 minims.

Colchici Semina—*Colchicum* Seeds, 'Meadow Saffron' Seeds.

Production.—The dried, ripe seeds of *Colchicum Autumnale*.

Characters.—Small reddish-brown seeds about the size of black mustard-seeds. Each seed is of a pointed globular shape. They are very hard and tough. No odour.

Composition.—As that of the corm, but no starch, and a little fixed oil.

Prescribing.—The tincture in mixtures.

Incompatibles.—As those of the Corm.

Preparation.—*Tinctura Colchici Seminum*—Tincture of *Colchicum* Seeds (*Colchicum* Seeds, alcohol 45 per cent.; Percolation—1 in 5). *Dose*: 5 to 15 minims.

Group XXVIII.—*Filix Mas* and *Santonin*.

*90. *Filix Mas*—Male Fern.

Production.—The Rhizome (underground stem) with the bases of the leaf-stalks of *Aspidium Filix-Mas*. Must not be more than one year old.

Characters.—A mass of curved, short, dark-brown stalks, closely overlapping each other, along a light-brown axis. The spaces between the stalks are more or less filled up with stiff brown hairs or threads. Each piece has the appearance of having been split off from a similar piece. The pieces vary in length from 3 to 6 inches, and in breadth up to 2 inches. No particular odour.

Recognition.—The general appearance of Male Fern is most peculiar and characteristic, and it cannot be confounded with any other drug.

Composition.—A fatty green oil, 'Filicic Acid,' colourless and crystalline, which is regarded as the active principle; and Tannic Acid.

Prescribing.—Internally, by means of the liquid extract, in a draught. Like most drugs for the destruction of worms, it should be given on an empty stomach, and followed by a purgative.

Preparation.—*Extractum Filicis Liquidum*—Liquid Extract of Male Fern, 'Oil of Male Fern' (Male Fern in powder, ether).

The Male Fern is exhausted with ether, and the ethereal solution evaporated, until the ether is driven off; the residue is Liquid Extract of Male Fern.

In dispensing, shake the bottle containing the extract, measure the dose in a warmed measure, rub down with a little powdered gum or mucilage, and dilute with water. It may be also given in capsules. *Dose*: 45 to 90 minims.

*91. *Santoninum*—Santonin.

Production.—A neutral crystalline principle prepared from *Santoniea* ('Wormseed'), the dried, unexpanded flower-heads of *Artemisia Maritima*.

Characters.—If the Santonin has not been much exposed to light, it is in the form of small, flat, colourless, shining crystals. On exposure to light, Santonin soon acquires a bright-yellow colour, and somewhat resembles Iodoform, but is deeper in colour. It is then often

called 'Photosantonin'; it does not appear to be altered in medicinal properties. The drug has no odour. With an alcoholic solution of potash it yields a violet-red colour. Almost insoluble in water. Taste feebly bitter.

Recognition.—Unaltered Santonin can be recognised by the peculiar appearance of its crystals; they have a characteristic shape and shining appearance. Compare them with Benzoic Acid, Salicylic Acid, and Gallic Acid. Yellow Santonin is easily recognised by its colour and absence of smell.

Prescribing.—Small doses may be given by means of the lozenges; larger, in powder, with sugar or suspended by mucilage. Like Male Fern, it is usually followed by a purgative, or it may be ordered with an aperient powder, such as Pulv. Jalap. Co.

Dose.—2 to 5 grains.

Incompatibles.—Potash.

Preparation.—*Trochiscus Santonini*—Lozenge of Santonin (1 grain in each), with the Simple basis.

Group XXIX.—Ergot.

*92. **Ergota**—Ergot, 'Ergot of Rye.'

Production.—The sclerotium or spawn of a species of Fungus, the *Claviceps Purpurea*, deposited in the grain of *Secale Cereale*, the common rye.

Characters.—More or less curved bodies, pointed at each end, varying in thickness up to that of slate pencil, and to $1\frac{1}{2}$ inches in length. Obscurely triangular in form, and marked on each face with a more or less distinct furrow. Colour dark brown externally, with sometimes a violet tint. Brittle, and when broken the broken surfaces yellowish or pinkish-white. Odour shrivpy, most peculiar and disagreeable, suggestive of decay; more marked in the powdered drug, especially when treated with potash.

Recognition.—The very peculiar appearance of Ergot at once identifies it. The odour also is very characteristic, and will identify the drug (grayish-brown in colour) when in powder; it is also noticeable in all the preparations. Ergot frequently has a smell of camphor, which is used to preserve it from insects, but even then the odour of the drug is also perceptible.

Composition.—There is much uncertainty as to the composition of Ergot. The most active constituents appear to be: 'Sphacelinic Acid,' insoluble in water, soluble in alcohol; 'Cornutine,' said to be an alkaloid, insoluble in water—this is probably the same thing as 'Ergotinine'—and a body called 'Ergotinic Acid,' said to be glucosidal. The first of these is probably the real active principle. Ergot also contains a large amount (30 per cent.) of fixed oil.

Prescribing.—Internally may be given in powder, but the liquid preparations are more convenient; the liquid extract and ammoniated tincture are chiefly used. Pills may be ordered of the extract. The nauseous taste is well disguised by spirit of chloroform. Ergot is also often used by hypodermic injection.

Dose (in powder).—20 to 60 grains.

Incompatibles.—Astringents, Ferrie salts.

Preparations.—1. *Extractum Ergotæ*—Extract of Ergot, 'Ergotin' (Ergot is exhausted by percolation with 60 per cent. alcohol, the liquid evaporated, diluted, and filtered, hydrochloric acid added to the filtrate, the mixture set aside for twenty-four hours, then filtered, carbonate of sodium added, and the mixture evaporated to a soft extract). *Dose*: 2 to 8 grains.

2. *Extractum Ergotæ Liquidum*—Liquid Extract of Ergot (Ergot is digested in distilled water, the marc pressed, and the liquid evaporated, some rectified spirit added, and after standing the mixture filtered—1=1). *Dose*: 10 to 30 minims.

3. *Injectio Ergotæ Hypodermica*—Hypodermic Injection of Ergot (Extract of Ergot, carbolic acid, recently boiled and cooled distilled water—33 per cent. Extract with 1 per cent. Carbolic Acid). *Dose*: 3 to 10 minims by subcutaneous injection.

4. *Infusum Ergotæ*—Infusion of Ergot (Ergot, boiling water; 15 minutes—1 ounce in 1 pint). *Dose*: 1 to 2 ounces.

5. *Tinctura Ergotæ Ammoniata*—Ammoniated Tincture of Ergot (Ergot, solution of ammonia, alcohol 60 per cent.; Percolation—1 in 4). *Dose*: 10 to 60 minims.

Group XXX.

*93. **Oleum Morrhuæ** — Cod-liver-oil, *Oleum Jecoris Aselli*.

Production.—The oil extracted from the fresh liver of the Cod, *Gadus Morrhua*. The fresh livers are cut open and washed in cold water, then placed in a vessel and exposed to a heat (by steam) not exceeding 180° F. The oil separates and floats on the surface of the mass, whence it is collected and filtered.

Characters.—A pale-yellow fixed oil, with a peculiar fishy smell. Exposed to the air in a thin film, it dries slowly to a resinous mass.

Recognition.—Cod-liver-oil is at once recognised by its odour and colour. These vary considerably, but the former is always more or less fishy or shrimp, and the latter more or less pale yellow.

Composition.—Chiefly consists of glycerides of the fatty acids (*e.g.*, Olein and Margarin). Traces of iodine and bromine are present. There is generally believed to be present a body containing phosphorus of the nature of 'Leeithin,' and, according to some authorities, Bile Acids.

Prescribing.—The oil to be used in medicine should always be a pale-yellow colour, and should not be rancid. Brown or dark-coloured oils are to be looked upon with suspicion. Cod-liver-oil is occasionally rubbed in externally as a nutritive, for children; it is easily absorbed in this way, but the process is unpleasant. Internally the oil may be given in many ways: alone if the taste is not objected to, or with pepper or salt. If it be floated on the surface of wine and swallowed at a gulp, it cannot be tasted at all. Other methods are in emulsions, with mucilage and a flavouring agent, such as Bitter Almonds, or mixed with Extract of Malt; the latter mixture is palatable and easily borne.

Dose.—1 to 4 drachms.

LIST OF DRUGS FOR RECOGNITION.

- | | |
|-----------------------------|------------------------------|
| 1. Prussic Acid. | 29. Permanganate of Potas- |
| 2. Alum. | sium. |
| 3. Carbonate of Ammo- | 30. Sublimed Sulphur. |
| nium. | 31. Precipitated Sulphur. |
| 4. Chloride of Ammonium. | 32. Sulphate of Zinc. |
| 5. Arsenious Acid. | 33. Rectified Spirit. |
| 6. Arseniate of Iron. | 34. Ether. |
| 7. Bromide of Potassium. | 35. Chloroform. |
| 8. Chlorinated Lime. | 36. Chloral Hydrate. |
| 9. Sulphate of Copper. | 37. Paraldehyde. |
| 10. Reduced Iron. | 38. Spirit of Nitrous Ether. |
| 11. Sulphate of Iron. | 39. Carbolic Acid. |
| 12. Saccharated Carbonate | 40. Creosote. |
| of Iron. | 41. Salicylic Acid. |
| 13. Citrate of Iron and Am- | 42. Iodoform. |
| monium. | 43. Aconite Root. |
| 14. Tartarated Iron. | 44. Opium. |
| 15. Citrate of Iron and | 45. Coca Leaves. |
| Quinine. | 46. Jaborandi Leaves. |
| 16. Mercury. | 47. Quassia Wood. |
| 17. Yellow Oxide of Mer- | 48. Calumba Root. |
| cury. | 49. Gentian Root. |
| 18. Red Oxide of Mercury. | 50. Calabar Bean. |
| 19. Calomel. | 51. Hemlock Fruit. |
| 20. Perchloride of Mercury. | 52. Asafoetida. |
| 21. Red Iodide of Mercury. | 53. Ammoniacum. |
| 22. Iodine. | 54. Myrrh. |
| 23. Iodide of Potassium. | 55. Guaiacum Resin. |
| 24. Sulphate of Magnesium. | 56. Red Cinchona Bark. |
| 25. Phosphorus. | 57. Sulphate of Quinine. |
| 26. Phosphate of Iron. | 58. Ipecacuanha Root. |
| 27. Oxide of Lead. | 59. Senega Root. |
| 28. Acetate of Lead. | 60. Glycerine. |

- | | |
|-------------------------|------------------------|
| 61. Nux Vomica Seeds. | 78. Indian Senna. |
| 62. Strychnine. | 79. Camphor. |
| 63. Belladonna Root. | 80. Oil of Turpentine. |
| 64. Stramonium Seeds. | 81. Cantharides. |
| 65. Indian Hemp. | 82. Benzoic Acid. |
| 66. Digitalis Leaves. | 83. Tannic Acid. |
| 67. Strophanthus Seeds. | 84. Gallic Acid. |
| 68. Squill Bulb. | 85. Kino. |
| 69. Castor-oil. | 86. Catechu. |
| 70. Barbadoes Aloes. | 87. Copaiba. |
| 71. Socotrine Aloes. | 88. Cubebs. |
| 72. Aloin. | 89. Colchicum Corn. |
| 73. Colocynth Pulp. | 90. Male Fern. |
| 74. Elaterium. | 91. Santonin. |
| 75. Jalap Root. | 92. Ergot. |
| 76. Rhubarb Root. | 93. Cod-liver-oil. |
| 77. Alexandrian Senna. | |

INDEX AND REFERENCE TABLE

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DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Acetanilide</i> . . .	—	1 to 3 grains	79
<i>Acetic Acid</i> . . .	33 per cent.	—	28
Dilute Acetic Acid . . .	1 to 7	$\frac{1}{2}$ to 2 drachms	
Glacial Acetic Acid . . .	99 per cent.	—	
<i>Acid, Arsenious</i> . . .	—	$\frac{1}{30}$ to $\frac{1}{15}$ grain	36
Liquor (acid) . . .	1 per cent.	2 to 8 minims	
Liquor (alkaline) . . .	1 per cent.	2 to 8 minims	
<i>Acid, Benzoic</i> . . .	—	5 to 15 grains	139
Lozenges . . .	$\frac{1}{2}$ grain in each	—	
<i>Acid, Boric</i> . . .	—	5 to 15 grains	29
Glycerine . . .	3 in 10	—	
Ointment . . .	1 in 10	—	
<i>Acid, Carbolic</i> . . .	—	1 to 3 grains	80
Glycerine . . .	1 to 5	—	
Liquid Carbolic Acid . . .	10 per cent.	1 to 3 minims	
water			
Lozenges . . .	1 grain in each	—	
Ointment . . .	1 in 25	—	
Suppositories . . .	1 grain in each	—	
<i>Acid, Citric</i> . . .	—	5 to 20 grains	29
<i>Acid, Gallic</i> . . .	—	5 to 15 grains	141
<i>Acid, Hydrochloric</i> . . .	32 per cent.	—	29
Dilute Acid . . .	6 in 20	5 to 20 minims	
<i>Acid, Hydrocyanic, Di-</i> <i>lute</i> . . .	2 per cent.	2 to 6 minims	30
Tincture Chlorof. and Morph. . .	1 in 20	5 to 15 minims	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Acid, Nitric</i>	70 per cent.	—	31
Dilute Acid	3 $\frac{3}{4}$ in 20	5 to 20 minims	
Nitrohydrochloric	Nitric 3, Hydroch. 4, in 25	5 to 20 minims	
<i>Acid, Phosphoric, Con.</i>	66·3 per cent.	—	59
Dilute Acid	13·8 per cent.	5 to 20 minims	
<i>Acid, Salicylic</i>	—	5 to 20 grains	82
Ointment	1 in 50	—	
<i>Acid, Sulphuric</i>	98 per cent.	—	31
Aromatic Acid	13·65 per cent.	5 to 20 minims	
Dilute Acid	13·8 per cent.	5 to 20 minims	
<i>Acid, Sulphurous</i>	6·4 per cent.	$\frac{1}{2}$ to 1 drachm	32
<i>Acid, Tannic</i>	—	2 to 5 grains	140
Glycerine	1 to 5	—	
Lozenges	$\frac{1}{2}$ grain in each	—	
Suppositories	3 grains in each	—	
<i>Acid, Tartaric</i>	—	5 to 20 grains	32
Seidlitz Powder	38 grains in each	—	
<i>Aconite Root</i>	—	—	87
Liniment	1 in 1 $\frac{1}{2}$	—	
Tincture	1 in 20	5 to 15 minims	
<i>Aconitine</i>	—	—	87
Ointment	1 in 50	—	
<i>Alcohol, Absolute</i>	99 per cent.	—	71
<i>Aloes, Barbadoes</i>	—	2 to 5 grains	124
Compound Decoction	1 in 100 ext.	$\frac{1}{2}$ to 2 oz.	
Extract	1 $\frac{1}{4}$ in 1	1 to 6 grains	
Pill	1 in 2	4 to 8 grains	
Pill, with Iron	1 in 4 $\frac{1}{2}$	4 to 8 grains	
Tincture	1 ext. in 40	$\frac{1}{2}$ to 2 drachms	
<i>Aloes, Socotrine</i>	—	2 to 5 grains	125
Pill	1 in 2	1 to 8 grains	
Pill, with Asafoetida	1 in 4	1 to 8 grains	
Pill, with Myrrh	1 in 2 $\frac{1}{4}$	4 to 8 grains	
<i>Aloin</i>	—	$\frac{1}{2}$ to 2 grains	126
<i>Alum</i>	—	5 to 10 grains	32
Glycerine	1 in 6	—	
<i>Alum, Dried</i>	—	—	33
<i>Alumina</i>	—	5 to 15 grains	102
Mixture	1 in 32	$\frac{1}{2}$ to 1 oz.	
Plaster, with Mercury	4 in 5	—	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Ammonium Acetate</i>	—	—	35
Solution	—	2 to 6 drachms	
<i>Ammonium Benzoate</i>	—	5 to 15 grains	140
<i>Ammonium Bromide</i>	—	5 to 30 grains	39
<i>Ammonium Carbonate</i>	—	3 to 10 grains	33
<i>Ammonium Chloride</i>	—	5 to 20 grains	33
<i>Ammonia</i>	—	—	34
Aromatic Spirit	—	20 to 40 or 60 to 90 minims	
Fetid Spirit	—	20 to 40 or 60 to 90 minims	
Liniment	1 in 4	—	
Liquor	1 to 2 (10 p.c.)	10 to 20 minims	
Strong Liquor	32.5 per cent.	—	
<i>Amyl Nitrite</i>	—	(Inhal.) 2 to 5 minims	77
<i>Antimony Oxide</i>	—	1 to 2 grains	60
Antimonial Powder	1 in 3	3 to 6 grains	
<i>Antimony, Tartarated</i>	—	($\frac{1}{24}$ to $\frac{1}{8}$ grain) (Diaph.), 1 to 2 grains (Emetic))	35
Wine	2 grains in 1 oz.	10 to 30 minims. Emetic 2 to 4 drachms	
<i>Antipyrin (Phenazonum)</i>	—	5 to 20 grains	79
<i>Apomorphine Hydro-</i> } <i>chloride</i> }	—	(Hyp. $\frac{1}{10}$ to $\frac{1}{5}$ grain Mouth $\frac{1}{10}$ to $\frac{1}{4}$ grain)	109
Hypodermic Injection	1 in 10	5 to 10 minims	
<i>Arsenic Iodide</i>	—	$\frac{1}{25}$ to $\frac{1}{8}$ grain	31
Solution, with Mer- cury Iodide	1 in 100	5 to 20 minims	
<i>Asafoetida</i>	—	5 to 15 grains	101
Compound Pill	1 in $3\frac{1}{2}$	4 to 8 grains	
Pill, with Aloes	1 in 4	4 to 8 grains	
Spirit, with Ammonia	$1\frac{1}{2}$ oz. in 1 pint	—	
Tincture	1 in 5	$\frac{1}{2}$ to 1 drachm	
<i>Atropine</i>	—	$\frac{1}{100}$ to $\frac{1}{100}$ gr.	116
Ointment	1 in 50	—	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE
<i>Atropine Sulphate</i>	—	$\frac{2}{100}$ to $\frac{1}{100}$ gr.	116
Lamella	$\frac{1}{1000}$ in each	—	
Solution	1 in 100	$\frac{1}{2}$ to 1 minim	
<i>Belladonna Leaves</i>	—	—	115
Green Extract	—	$\frac{1}{4}$ to 1 grain	
Juice	—	5 to 15 minims	
<i>Belladonna Root</i>	—	—	113
Alcoholic Extract	1 per cent. alkaloids	$\frac{1}{4}$ to 1 grain	
Liquid Extract . . . . .	.75 per cent. alkaloids	—	
Liniment . . . . .	.37 per cent. alkaloids	—	
Ointment . . . . .	.6 per cent. alkaloids	—	
Plaster . . . . .	.5 per cent. alkaloids	—	
Suppositories	$\frac{1}{10}$ grain alkaloids in each	—	
Tincture . . . . .	.05 per cent. alkaloids	5 to 15 minims	
<i>Benzoin</i>	—	—	139
Benzoated Lard	3 per cent.	—	
Compound Tincture	1 in 10	$\frac{1}{2}$ to 1 drachm	
<i>Bismuth Carbonate</i>	—	5 to 20 grains	39
Lozenges	2 grains in each	—	
<i>Bismuth Salicylate</i>	—	5 to 20 grains	39
<i>Bismuth Subnitrate</i>	—	5 to 20 grains	39
<i>Borax</i>	—	5 to 20 grains	66
Glycerine	1 in $8\frac{1}{2}$	—	
Honey	1 in 7	—	
<i>Butyl Chloral Hydrate</i>	—	5 to 20 grains	76
<i>Caffein</i>	—	1 to 5 grains	99
<i>Caffein Citrate</i>	—	2 to 10 grains	100
Effervescing Citrate	4 per cent.	1 to 2 drachms	
<i>Calcium Carb., Precipitated</i>	—	10 to 60 grains	41
Syrup of Lactophosphate of Calcium	—	$\frac{1}{2}$ to 1 drachm	
<i>Calcium Hydrate</i>	—	—	41
Lime-water	$\frac{1}{2}$ grain CaO in 1 oz.	$\frac{1}{2}$ to 4 oz.	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Calcium Hydrate</i> — <i>continued</i>			
Liniment (of Lime) .	1 in 2 Liq. Calc.	—	
Saccharated Solution .	7.11 grains CaO in 1 oz.	20 to 60 minims	
<i>Calcium Hypophosphite</i> .	—	3 to 10 grains	61
<i>Calcium Phosphate</i> .	—	5 to 15 grains	59
<i>Calumba Root</i> . . .	—	—	96
Infusion	1 in 20	$\frac{1}{2}$ to 1 oz.	
Concentrated Solu- tion	1 in 2	$\frac{1}{2}$ to 1 drachm	
Tincture	1 in 10	$\frac{1}{2}$ to 1 drachm	
<i>Camphor</i>	—	2 to 5 grains	135
Ammoniated Lini- ment	1 in 8	—	
Compound Tincture .	$\left\{ \begin{array}{l} 1\frac{1}{2} \text{ gr. in 1 oz.} \\ 2 \text{ grs. opium} \\ \text{in 1 oz.} \end{array} \right\}$	30 to 60 minims	
Liniment	1 in 5	—	
Spirit	1 in 10	5 to 20 minims	
Water	1 in 1,000	1 to 2 oz.	
<i>Cannabis Indica</i> . . .	—	—	119
Extract	—	$\frac{1}{4}$ to 1 grain	
Tincture	1 Ext. in 20	5 to 15 minims	
<i>Cantharides</i>	—	—	137
Blistering Collodion .	—	—	
Blistering Solution .	1 in 2	—	
Ointment	1 in 10	—	
Plaster	1 in 3	—	
Tincture	1 in 80	5 to 15 or 2 to 5 minims	
Vinegar	1 in 10	—	
Warming Plaster . . .	1 in 25	—	
<i>Cascara Sagrada</i> . . .	—	—	127
Extract	—	2 to 8 grains	
Liquid Extract	1 = 1	$\frac{1}{2}$ to 1 drachm	
Aromatic Syrup	1 Liquid Ext. in 2 $\frac{1}{2}$	$\frac{1}{2}$ to 2 drachms	
<i>Castor-oil</i>	—	1 to 8 drachms	123
Mixture	3 drachms in 1 oz.	$\frac{1}{2}$ to 2 oz.	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Catechu</i>	—	5 to 15 grains	
Compound Powder	1 in 2½	10 to 40 grains	
Lozenges	1 grain in each	—	
Tincture	1 in 5	½ to 1 drachm	
<i>Chalk, Prepared</i>	—	10 to 60 grains	42
Aromatic Powder	1 in 1	10 to 60 grains	
Aromatic Powder, with Opium	1 in 40 Opium	10 to 40 grains	
Mixture	1 in 32	½ to 1 oz.	
<i>Chloral Hydrate</i>	—	5 to 20 grains	75
Syrup	10 grs. in 1 dr.	½ to 2 drachms	
<i>Chloroform</i>	—	1 to 5 minims	74
Liniment	1 in 2	—	
Spirit	1 in 20	5 to 20 or 30 to 40 minims	
Tincture, with Mor- phine	1 in 13	5 to 15 minims	
Water	1 in 400	½ to 2 oz.	
<i>Cinchona Bark (Red)</i>	5 to 6 per cent. alkaloids	15 grs. to 2 drs.	104
Acid Infusion	1 in 20	½ to 1 oz.	
Compound Tincture	5 per cent. al- kaloids	½ to 1 drachm	
Liquid Extract	5 per cent. al- kaloids	5 to 15 minims	
Tincture	1 per cent. al- kaloids	½ to 1 drachm	
<i>Coca Leaves (Coca)</i>	—	—	93
Liquid Extract	1 = 1	½ to 1 drachm	
<i>Cocaine</i>	—	—	94
Ointment	4 per cent.	—	
<i>Cocaine Hydrochlorate</i>	—	½ to ½ grain	94
Hypodermic Injec- tion	10 per cent.	2 to 5 minims	
Lamella	⅛ grain in each	—	
Lozenges with Rhat- any	⅛ grain in each	—	
<i>Codeine</i>	—	¼ to 2 grains	92
<i>Codeine Phosphate</i>	—	¼ to 2 grains	92
Syrup	¼ gr. in 1 dr.	½ to 2 drachms	
<i>Cod-liver-oil</i>	—	1 to 4 drachms	151

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Colchicum Corm</i>	—	2 to 5 grains	146
Extract	—	$\frac{1}{4}$ to 1 grain	
Wine	1 in 5	10 to 30 minims	
<i>Colchicum Seeds</i>	—	—	147
Tincture	1 in 5	5 to 15 minims	
<i>Collodium</i>	1 in 48	—	80
<i>Collodium Flexile</i>	—	—	80
<i>Colocynth Pulp</i>	—	2 to 6 grains	127
Compound Extract	1 to $4\frac{1}{2}$	2 to 8 grains	
Compound Pill	1 in 6	4 to 8 grains	
Pill, with Hyoscyamus	1 in 9	4 to 8 grains	
<i>Conium Leaves</i>	—	—	100
Juice	—	1 to 2 drachms	
Ointment	2 oz. juice in 1 oz.	—	
<i>Conium Fruit</i>	—	—	100
Tincture	1 in 5	30 to 60 minims	
<i>Copaiba</i>	—	$\frac{1}{2}$ to 1 drachm	145
<i>Copaiba-oil</i>	—	5 to 20 minims	145
<i>Copper Sulphate</i>	—	$\left\{ \begin{array}{l} \frac{1}{4} \text{ to } 2 \text{ grains} \\ \text{(Astringent)} \\ 5 \text{ to } 10 \text{ grs.} \\ \text{(Emetic)} \end{array} \right\}$	43
<i>Creosote</i>	—	1 to 5 minims	81
Mixture	1 minim in 1 oz.	$\frac{1}{2}$ to 1 oz.	
Ointment	1 in 10	—	
<i>Croton-oil</i>	—	$\frac{1}{2}$ to 1 minim	123
Liniment	1 in 8	—	
<i>Cubebs</i>	—	$\frac{1}{2}$ to 1 drachm	146
Essential Oil	—	5 to 20 minims	
Tincture	1 in 5	$\frac{1}{2}$ to 1 drachm	
<i>Digitalis Leaves</i>	—	$\frac{1}{2}$ to 2 grains	120
Infusion	1 dr. in 1 pint	2 to 4 drachms	
Tincture	1 in 8	5 to 15 minims	
<i>Elaterin</i>	—	$\frac{1}{10}$ to $\frac{1}{10}$ grain	129
Compound Powder	1 in 40	1 to 4 grains	
<i>Elaterium</i>	—	$\frac{1}{10}$ to $\frac{1}{2}$ grain	128
<i>Ergot</i>	—	20 to 60 grains	149
Extract	—	2 to 8 grains	
Liquid Extract	1=1	10 to 30 min.	
Hypoderm. Injection	1 in 3 Ext.	3 to 10 minims	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Ergot—continued</i>			
Infusion	1 in 20	1 to 2 oz.	
Ammoniated Tincture	1 in 4	$\frac{1}{2}$ to 1 drachm	
Ether	92 per cent.	10 to 30 or 40 to 60 minims	73
Compound Spirit . .	—	20 to 40 or 60 to 90 minims	
Pure Ether	—	—	
Spirit	1 in 3	20 to 40 or 60 to 90 minims	
Galls	—	—	142
Ointment	1 in 5	—	
Ointment, with Opium	$\left. \begin{array}{l} 32 \text{ grs. Op.} \\ \text{in 1 oz.} \end{array} \right\}$	—	
Gentian Root	—	—	97
Compound Infusion .	1 in 80	$\frac{1}{2}$ to 1 oz.	
Compound Tincture .	1 in 10	$\frac{1}{2}$ to 1 drachm	
Extract	—	2 to 8 grains	
Glycerine	—	1 to 2 drachms	111
Suppositories . . .	70 per cent.	—	
Guaiacum Resin . . .	—	5 to 15 grains	103
Ammoniated Tincture	1 in 5	$\frac{1}{2}$ to 1 drachm	
Lozenges	3 grs. in each	—	
Mixture	1 in 40	$\frac{1}{2}$ to 1 ounce	
Hamamelis Bark . . .	—	—	144
Tincture	1 in 10	30 to 60 minims	
Hamamelis Leaves . .	—	—	144
Liquid Extract . . .	1 = 1	5 to 15 minims	
Ointment	1 in 10	—	
Solution	1 = 1	—	
Henbane Leaves . . .	—	—	117
Extract	—	2 to 8 grains	
Juice	—	$\frac{1}{2}$ to 1 drachm	
Tincture	1 in 10	$\frac{1}{2}$ to 1 drachm	
Homatropine Hydrobromide	—	$\frac{1}{80}$ to $\frac{1}{40}$ grain	116
Lamelke	$\frac{1}{100}$ gr. in each	—	
Hyoscine Hydrobromide	—	$\frac{1}{100}$ to $\frac{1}{100}$ gr.	118
Hyoscyamine Sulphate	—	$\frac{1}{100}$ to $\frac{1}{100}$ gr.	118

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Iodoform</i>	—	$\frac{1}{2}$ to 3 grains	83
Ointment.	1 in 10	—	
Suppositories	3 grains in each	—	
<i>Iodine</i>	—	$\frac{1}{16}$ to $\frac{1}{4}$ grain	54
Ointment.	1 in 25	—	
Strong Solution	1 in $8\frac{1}{2}$	—	
Tincture	1 in 40	2 to 5 minims	
<i>Ipecacuanha Root</i>	—	$\left\{ \begin{array}{l} \frac{1}{2} \text{ to } 2 \text{ grains} \\ \text{(Expect.)} \end{array} \right\}$	108
Liquid Extract	2 to 2.5 per cent. alkaloids	$\left\{ \begin{array}{l} \frac{1}{2} \text{ to } 2 \text{ min.} \\ \text{(Expect.)} \\ 15 \text{ to } 20 \text{ min.} \\ \text{(Emetic)} \end{array} \right\}$	
Lozenges	$\frac{1}{4}$ grain in each	—	
Lozenges, with Mor- phine	$\left\{ \begin{array}{l} \frac{1}{16} \text{ and } \frac{3}{16} \\ \text{Morphine} \end{array} \right\}$	—	
Pill, with Squill	1 in 23 and 1 in 20 Opium	4 to 8 grains	
Compound Powder	1 in 10 and 1 in 10 Opium	5 to 15 grains	
Vinegar	1 per cent. alkaloids	10 to 30 min.	
Wine	$\left\{ \begin{array}{l} 1 \text{ per cent.} \\ \text{alkaloids} \end{array} \right\}$	$\left\{ \begin{array}{l} (10 \text{ to } 30 \text{ min.}) \\ \text{(Expect.)} \\ 4 \text{ to } 6 \text{ dr.} \\ \text{(Emetic)} \end{array} \right\}$	
<i>Iron</i>	—	—	43
Wine	—	1 to 4 drachms	
<i>Ammonio-Citrate of</i> <i>Iron</i>	—	5 to 10 grains	47
Wine	1 gr. in 1 dr.	1 to 4 drachms	
<i>Acetate of Iron Sol.</i>	—	5 to 15 minims	46
<i>Arsenate of Iron</i>	—	$\frac{1}{16}$ to $\frac{1}{4}$ grain	38
<i>Citrate of Iron and</i> <i>Quinine</i>	$\left\{ \begin{array}{l} 15 \text{ per cent.} \\ \text{Quinine} \end{array} \right\}$	5 to 10 grains	48
<i>Dried Sulphate of</i> <i>Iron</i>	3 = 5	$\frac{1}{2}$ to 3 grains	45
Iron Pill	1 in 5 Car- bonate	5 to 15 grains	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Iron, Dried Sulphate</i> —continued			
Pill of Aloes and Iron	1 in 9	4 to 8 grains	
Iodide of Iron	—	—	49
Syrup	5·5 grains in 1 drachm	30 to 60 min.	
<i>Perchloride of Iron,</i> <i>Strong Solution.</i>	—	—	46
Solution	{ 1 in 4 Strong Solution }	5 to 15 minims	
Tincture	{ 1 in 4 Strong Solution }	5 to 15 minims	
<i>Pernitrate of Iron So-</i> <i>lution</i>	—	5 to 15 minims	47
<i>Persulphate of Iron So-</i> <i>lution</i>	—	—	47
<i>Phosphate of Iron</i> Syrup	—	5 to 10 grains	
	1 gr. in 1 dr.	$\frac{1}{2}$ to 1 drachm	60
Syrup, with Quin- ine and Strych- nine	{ 1 gr. Phosphate of Iron, $\frac{1}{2}$ Quinine, $\frac{1}{2}$ Strychnine, in 1 drachm }	$\frac{1}{2}$ to 1 drachm	
<i>Reduced Iron</i>	—	1 to 5 grains	44
Lozenges	1 grain in each	1 to 6	
<i>Saccharated Carbon-</i> <i>ate of Iron.</i>	—	10 to 30 grains	45
<i>Sulphate of Iron</i>	—	1 to 5 grains	44
Compound Mixture	2 $\frac{1}{2}$ grs. in 1 oz.	$\frac{1}{2}$ to 1 oz.	
<i>Tartarated Iron</i>	—	5 to 10 grains	48
<i>Jaborandi Leaves.</i>	—	—	94
Liquid Extract	1 = 1	5 to 15 minims	
Tincture	1 in 5	$\frac{1}{2}$ to 1 drachm	
<i>Jalap</i>	—	5 to 20 grains	129
Compound Powder	1 in 3	20 to 60 grains	
Extract	1 = 2	2 to 8 grains	
Tincture	1 $\frac{1}{2}$ per cent. Resin	$\frac{1}{2}$ to 1 drachm	
<i>Jalap Resin.</i>	—	2 to 5 grains	130
<i>Kino</i>	—	5 to 20 grains	142

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Kino—continued</i>			
Compound Powder . . .	3 in 4 (1 in 20 Opium)	5 to 20 grains	62
Tincture	1 in 10	$\frac{1}{2}$ to 1 drachm	
<i>Lead Acetate</i>	—	1 to 5 grains	
Compound Suppositories	{ 3 grs. Lead, } { 1 Op., in each }	—	
Ointment	1 in 25	—	63
Pill, with Opium	3 in 4 (1 Op. in 8)	2 to 4 grains	
<i>Lead Subacetate</i>	—	—	
Dilute Solution	1 in 80	—	
Glycerine	—	—	55
Ointment of Glycerine	1 in 6	—	
Strong Solution	24 per cent.	—	
<i>Lead Iodide</i>	—	—	
Ointment	1 in 10	—	61
Plaster	1 in 10	—	
<i>Lead Oxide</i>	—	—	
Plaster	—	—	
<i>Lime</i>	—	—	40
<i>Lime, Chlorinated</i>	33 per cent. Cl	—	42
Solution	1 in 10 (3 p. c. Cl)	—	69
<i>Lime, Sulphurated</i>	50 per cent.	$\frac{1}{4}$ to 1 grain	
<i>Magnesia, Light</i>	—	5 to 30 or 30 to 60 grs.	
<i>Magnesia, Heavy</i>	—	5 to 30 or 30 to 60 grs.	
<i>Magnesium Carbonate, Light</i>	—	5 to 30 or 30 to 60 grs.	57
<i>Magnesium Carbonate, Heavy</i>	—	5 to 30 or 30 to 60 grs.	57
Solution	10 grs. in 1 oz.	1 to 2 oz.	56
<i>Magnesium Sulphate</i>	—	$\frac{1}{2}$ to 2 drachms or $\frac{1}{4}$ to $\frac{1}{2}$ oz.	
Effervescing Sulphate	1 in 2	1 to 4 drachms or $\frac{1}{2}$ to 1 oz.	
<i>Male Fern</i>	—	—	148
Liquid Extract	—	40 to 90 mins.	49
<i>Mercury</i>	—	—	
Compound Ointment	1 in 5	—	
Liniment	1 in 6	—	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Mercury—continued</i>			
Ointment.	1 in 2	—	
Pill	1 in 3	4 to 8 grains	
Plaster	1 in 3	—	
Plaster, with Am- moniacum	1 in 5	—	
Powder with Chalk .	1 in 3	1 to 5 grains	
<i>Acid Nitrate of Mer- cury</i>	—	—	54
<i>Ammoniated Mercury</i> Ointment	— 1 in 10	—	53
<i>Oleate of Mercury</i> .	—	—	54
Ointment	1 in 4	—	
<i>Perchloride of Mer- cury</i>	—	$\frac{1}{32}$ to $\frac{1}{16}$ grain	52
Solution	$\frac{1}{2}$ grain in 1 oz.	$\frac{1}{2}$ to 1 drachm	
Yellow Mercurial Lotion { 40 grains in } { 1 pint }	—	—	
<i>Red Iodide of Mercury</i> Ointment	— 1 in 25	$\frac{1}{32}$ to $\frac{1}{16}$ grain	53
Solution, with Ar- senic Iodide	1 per cent.	5 to 20 minims	
<i>Red Oxide of Mer- cury</i>	—	—	51
Ointment	1 in 10	—	
<i>Subchloride of Mer- cury</i>	—	$\frac{1}{2}$ to 5 grains	51
Black Mercurial Lotion	3 grs. in 1 oz.	—	
Compound Pill . . .	1 in $4\frac{1}{2}$	4 to 8 grains	
Ointment	1 in 10	—	
<i>Yellow Oxide of Mer- cury</i>	—	—	50
Ointment	1 in 50	—	
<i>Morphine Acetate</i> . .	—	$\frac{1}{4}$ to $\frac{1}{2}$ grain	92
Solution	1 in 100	10 to 60 min.	
<i>Morphine Hydrochlo- ride</i>	—	$\frac{1}{8}$ to $\frac{1}{2}$ grain	91
Lozenges	$\frac{1}{8}$ gr. in each	—	
Lozenges, with Ipec- acuanha	$\frac{1}{8}$ gr. in each	—	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Morphine Hydrochloride</i> —continued			
Solution	1 in 100	10 to 60 min.	
Suppositories . .	$\frac{1}{4}$ grain in each	—	
Tincture of Chloro- form and Mor- phine	($\frac{1}{10}$ grain in) (10 minims)	—	
<i>Myrrh</i>	—	—	103
Pill, with Aloes . .	1 in $4\frac{1}{2}$	4 to 8 grains	
Tincture	1 in 5	$\frac{1}{2}$ to 1 drachm	
<i>Nitroglycerine</i> . .	—	$\frac{1}{200}$ to $\frac{1}{50}$ gr.	77
Solution	1 in 100	$\frac{1}{2}$ to 2 minims	
Tablets	$\frac{1}{100}$ gr. in each	1 to 2	
<i>Nux Vomica</i>	—	—	112
Extract	5 per cent. Strychnine	$\frac{1}{4}$ to 1 grain	
Liquid Extract . .	1.5 per cent. Strychnine.	1 to 3 minims	
Tincture . . . . .	.25 per cent. Strychnine.	5 to 15 minims	
<i>Opium</i>	—	$\frac{1}{2}$ to 2 grains	88
Compound Powder .	1 in 10	2 to 10 grains	
Extract	20 per cent. Morphine.	$\frac{1}{2}$ to 1 grain	
Liniment	1 (Tincture) in 2	—	
Liquid Extract . .	.75 per cent. Morphine	5 to 30 min.	
Ointment, with Galls	32 grs. in 1 oz.	—	
Pill (Saponis) . . .	1 in 5	2 to 4 grains	
Plaster	1 in 10	—	
Powder, with Chalk .	1 in 40	10 to 40 grains	
Tincture . . . . .	.75 per cent. Morphine	5 to 15 or 20 to 30 minims	
Ammoniated Tinc- ture	1 Opium in 96 minims	$\frac{1}{2}$ to 1 drachm	
<i>Paraldehyde</i>	—	$\frac{1}{2}$ to 2 drachms	75
<i>Phenacetin</i>	—	5 to 10 grains	79
<i>Phenazone (Antipyrin)</i> .	—	5 to 20 grains	79
<i>Phosphorus</i>	—	$\frac{1}{100}$ to $\frac{1}{25}$ grain	58
Phosphorized Oil . .	1 in 100	1 to 5 minims	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Phosphorus—continued</i>			
Pill	2 in 100	1 to 2 grains	
<i>Physostigma Bean</i>	—	1 to 4 grains	98
Extract	—	$\frac{1}{4}$ to 1 grain	
<i>Physostigmine Sulphate</i>	—	—	98
Lamella	1000 gr. in each	—	
<i>Pilocarpine Nitrate</i>	—	$\frac{1}{20}$ to $\frac{1}{2}$ grain	95
<i>Podophyllum Rhizome</i>	—	—	130
<i>Podophyllin Resin</i>	—	$\frac{1}{4}$ to 1 grain	131
Tincture	2 grs. in 1 dr.	5 to 15 minims	
<i>Potash, Caustic</i>	—	—	64
Solution	27 grs. in 1 oz.	10 to 30 min.	
<i>Potash, Sulphurated</i>	—	—	69
<i>Potassium Acid Tartrate</i>	—	20 to 60 grains	65
<i>Potassium Bicarbonate</i>	—	5 to 30 grains	63
<i>Potassium Bromide</i>	—	5 to 30 grains	40
<i>Potassium Chlorate</i>	—	5 to 15 grains	63
Lozenges	3 grs. in each	—	
<i>Potassium Iodide</i>	—	5 to 20 grains	55
Liniment, with Soap	54 $\frac{1}{2}$ grains in 1 oz.	—	
Ointment	1 in 10	—	
<i>Potassium Perma- ganate</i>	—	1 to 3 grains	65
Solution	1 per cent.	2 to 4 drachms	
<i>Potassium Sulphate</i>	—	10 to 40 grs.	64
<i>Quassia Wood</i>	—	—	96
Concentrated Solu- tion	1 in 10	$\frac{1}{2}$ to 1 drachm	
Infusion	1 in 100	$\frac{1}{2}$ to 1 oz.	
Tincture	1 in 10	$\frac{1}{2}$ to 1 drachm	
<i>Quinine Hydrochloride</i>	—	1 to 10 grains	107
Tincture	2 in 100	$\frac{1}{2}$ to 1 drachm	
Wine	1 gr. in 1 oz.	$\frac{1}{2}$ to 1 oz.	
<i>Quinine Acid Hydro- chloride</i>	—	1 to 10 grains	107
<i>Quinine Sulphate</i>	—	1 to 10 grains	106
Ammoniated Tinc- ture	2 in 100	$\frac{1}{2}$ to 1 drachm	
Pill	5 in 6	2 to 8 grains	
Resin	—	—	137

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Resin—continued</i>			
Ointment	1 in $3\frac{3}{4}$	—	
Plaster	1 in $9\frac{1}{2}$	—	
<i>Rhubarb Root</i>	—	3 to 10 or 15 to 30 grains	131
Compound Pill	1 in 4	4 to 8 grains	
Compound Powder	1 in $4\frac{1}{2}$	20 to 60 grs.	
Concentrated Solu- tion	1 in 2	$\frac{1}{2}$ to 1 drachm	
Extract	—	2 to 8 grains	
Infusion	1 in 20	$\frac{1}{2}$ to 1 oz.	
Syrup	—	$\frac{1}{2}$ to 2 drachms	
Compound Tincture	—	($\frac{1}{2}$ to 1 dr. (Stomachic) 2 to 4 drs. (Purgative))	
<i>Salicin</i>	—	5 to 20 grains	108
<i>Salol</i>	—	5 to 15 grains	83
<i>Santonin</i>	—	2 to 5 grains	118
Lozenges	1 grain in each	—	
<i>Senega Root</i>	—	—	110
Infusion	1 in 20	$\frac{1}{2}$ to 1 oz.	
Concentrated Solution	1 in 2	$\frac{1}{2}$ to 1 drachm	
Tincture	1 in 5	$\frac{1}{2}$ to 1 drachm	
<i>Senna, Alexandrian</i>	—	10 to 30 grains	133
<i>Senna, Indian</i>	—	10 to 30 grains	133
Compound Mixture	1 in 4 Mag. Sulph.	1 to 2 oz.	
Compound Liquorice Powder	1 in 6	1 to 2 drachms	
Confection	1 in 11	1 to 2 drachms	
Concentrated Solution	1 in 1	$\frac{1}{2}$ to 1 drachm	
Infusion	1 in 10	1 to 2 oz.	
Syrup	—	$\frac{1}{2}$ to 2 drachms	
Compound Tincture	1 in 5	$\frac{1}{2}$ to 1 or 2 to 4 drachms	
<i>Silver Nitrate</i>	—	$\frac{1}{4}$ to $\frac{1}{2}$ grain	36
Mitigated Caustic	1 in 3	—	
Toughened Caustic	95 per cent.	—	
<i>Soda, Chlorinated</i>	—	—	43
Solution	2.5 per cent. Chlorine	10 to 20 minims	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Sodium Arsenate</i>	—	$\frac{1}{16}$ to $\frac{1}{16}$ grain	38
Solution	1 in 100	2 to 8 minims	
<i>Sodium Benzoate</i>	—	5 to 30 grains	140
<i>Sodium Bicarbonate</i>	—	5 to 30 grains	66
Lozenges	3 grains in each	—	
<i>Sodium Bromide</i>	—	5 to 30 grains	40
<i>Sodium Hypophosphite</i>	—	3 to 10 grains	61
<i>Sodium Iodide</i>	—	5 to 10 grains	56
<i>Sodium Nitrite</i>	—	1 to 2 grains	67
<i>Sodium Phosphate</i>	—	$\frac{1}{2}$ to 2 drachms	60
Effervescing Phos-) phate)	1 in 2	or $\frac{1}{4}$ to $\frac{1}{2}$ oz.	
<i>Sodium Salicylate</i>	—	10 to 30 grains	83
<i>Sodium Sulphate</i>	—	$\frac{1}{2}$ to 2 drachms	67
Effervescing Sulphate	1 in 2	or $\frac{1}{4}$ to $\frac{1}{2}$ oz.	
<i>Spirit of Nitrous Ether</i>	—	$\frac{1}{2}$ to 2 dr., or $\frac{1}{4}$ to $\frac{1}{2}$ oz.	78
<i>Spirit, Rectified</i>	90 per cent. Alcohol	20 to 40 or 60 to 90 minims	72
<i>Squill Bulb</i>	—	1 to 3 grains	121
Compound Pill	1 in 4	4 to 8 grains	
Oxymel	—	$\frac{1}{2}$ to 1 drachm	
Pill, with Ipecac.	1 in 6 (1 in 20 Opium)	4 to 8 grains	
Syrup	—	$\frac{1}{2}$ to 1 drachm	
Tincture	1 in 5	5 to 15 minims	
Vinegar	1 in 8	10 to 30 minims	
<i>Stramonium Leaves</i>	—	—	119
Tincture	1 in 5	5 to 15 minims	
<i>Stramonium Seeds</i>	—	—	118
Extract	—	$\frac{1}{4}$ to 1 grain	
<i>Strophanthus Seeds</i>	—	—	121
Extract	—	$\frac{1}{4}$ to 1 grain	
Tincture	1 in 40	5 to 15 minims	
<i>Strychnine</i>	—	$\frac{1}{8}$ to $\frac{1}{16}$ grain	113
<i>Strychnine Hydro- chloride</i>	—	$\frac{1}{16}$ to $\frac{1}{16}$ grain	113
Solution	1 in 100	2 to 8 minims	

DRUGS AND PREPARATIONS.	STRENGTHS.	DOSES.	PAGE.
<i>Sublimed Sulphur</i>	—	20 to 60 grains	67
Confection	1 in 2½	1 to 2 drachms	
Ointment	1 in 10	—	
<i>Sulphonal</i>	—	10 to 30 grains	76
<i>Sulphur, Precipitated</i>	—	20 to 60 grains	68
Lozenges	5 grains in each	—	
<i>Terebene</i>	—	5 to 15 minims	137
<i>Turpentine</i>	—	2 to 10 minims or 3 to 4 drs.	136
Acetic Liniment	1 in 2	—	
Liniment	1 in 1½	—	
<i>Zinc Chloride</i>	—	—	69
Solution	sp. gr. 1.53	—	
<i>Zinc Oxide</i>	—	3 to 10 grains	70
Ointment	1 in 6½	—	
<i>Zinc Sulphate</i>	—	(1 to 3 grains) (Tonic)	70
		10 to 30 grs. (Emetic)	
Ointment of Oleate	—	—	

THE END.



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